The British Interplanetary Society and Cultures of Outer Space,

1930 - 1970

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Thesis submitted to the University of Nottingham for the degree of

Doctor of Philosophy

July 2011

Abstract

This thesis explores the institutional and cultural development of the British Interplanetary Society (BIS) and its influence in wider cultures of 'British outer space' in the mid-twentieth century. The Society was founded in 1933 in Liverpool by P E Cleator, and having attracted a small group of enthusiastic members before the outbreak of the Second World War, successfully re-grouped after the conflict and grew to become one of the most influential of all the space flight societies by the 1960s. The thesis starts by examining the ways in which the discipline of geography has recently started to re-engage with outer space as a field of enquiry, and suggests that geopolitical and cultural approaches to studying outer space would be a productive academic pursuit. The empirical chapters start by looking at the institutional cultures of the BIS, and explore the relationship between the Society and the production of interplanetary knowledge. The Society's global connections and internationalist stance are also brought into focus, with contrasting accounts identified before and after the war raising questions about the geopolitics of British outer space. The empirical chapters go on to study how the BIS became connected to the wider world of popular culture in Britain, examining imaginative and amateur representations and performances. This section includes analyses of certain science fiction texts, including the selected novels of Olaf Stapledon, Arthur C Clarke and C S Lewis, and also considers Frank Hampson's *Dan Dare* space adventure comics and the long-running television series *The Sky at Night*, whilst maintaining an empirical connection to the BIS throughout. The thesis closes with a discussion of what it means to bring together materials from both institutional and popular cultures, in the context of the emerging research area of the geographies of outer space.

Acknowledgements

This thesis has benefited from the guidance and assistance of staff and colleagues at the University of Nottingham School of Geography, in particular my supervisors David Matless and Mike Heffernan. Others who have contributed to the supportive environment in which the thesis was produced include fellow postgraduates and tea-drinkers Lauren Gough, Chris Parker, Ruth Craggs, Kate Lynch, Lucy Veale, Pantelis Arvanitis, Amber Martin and Stacey Coppock, as well as the helpful support staff both from the School of Geography and the Hallward Library at Nottingham. I am also appreciative towards those who have assisted my research from the British Interplanetary Society, in particular Mary Todd and Bob Parkinson MBE. Furthermore, those who have answered various unsolicited obscure questions have been extremely helpful along the way, including John Liffen and Doug Millard of the Science Museum, Jeff Walden and Paul Vanezis from the BBC, and not forgetting Sir Patrick Moore for his valuable time.

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Chapter 1

Introduction

This thesis developed out of a long-standing interest in outer space and space exploration, which started with childhood awe at the sight of American space shuttles and Soviet space stations on the television and in the news. Intellectual engagements with cultural geography at degree and masters' level prompted a realisation that outer space could be considered geographically, and whilst histories of space exploration had been written, a cultural geography approach to 'British outer space', promised to be an area of research that would invite intrigue and reflection. Initial ideas revolved around the relationships between Britain and the well-documented 'space race' between the USA and the Soviet Union, which began with the launch of *Sputnik 1* in 1957 and culminated with the *Apollo* Moon landings in 1969. What was not anticipated were the cultural and historical depths which this thesis would explore, as, instead of the familiar stories of heroic British failure, the cultural and institutional reverberations of interplanetary science were found to reach out extensively to both scientific and artistic fields of knowledge and representation. The range of documentation and rich history of the British Interplanetary Society (BIS) suggested that this organisation could form the core of the thesis. However, wanting to avoid an exclusively inward-looking institutional history, it was decided to investigate the extent to which discourses within the BIS drew upon and influenced wider cultures, and these connections rapidly multiplied the more the Society was examined. From an initial aim to focus on one or two connected sources from popular culture, such as the novels of Arthur C Clarke or the *Dan Dare* comics, a whole array of source materials were opened up to potential analysis, which could all be traced back to the highly influential BIS. As such, the historical scope of this thesis ranges from 1930, when ideas started to come together in parts of Britain around the idea of interplanetary travel, influenced by activities in other countries and technological

developments at home, to 1970, when membership levels within the BIS had reached a plateau, and the goal of interplanetary exploration, so rarely believed possible before the Second World War, had been achieved.

The British Interplanetary Society and its key members

The BIS is a little-known organisation outside of space science circles. As it is the primary empirical focus of this thesis, it is appropriate here to give some introductory information about the Society and some of its more renowned members. Established in 1933, the BIS claims to be the world's longest-running organisation devoted to the idea of space exploration, or astronautics as it came to be known, and it also produces the world's longest-running astronautics publication, the *Journal of the British Interplanetary Society*[1]. Astronautics groups existed in other parts of the world in the 1920s, but these organisations were short-lived, whereas the BIS survived the Second World War and still remains in existence. The geographical scales that this thesis spans in relation to the BIS range from the domestic spaces of cafés, pubs and private houses, to the cities of Liverpool and London, as well as national, international and, indeed, interplanetary conceptions of space.

At certain times in the early decades of the BIS there was a perception that membership would fall within two unofficial categories, the 'technical people' and the 'idealists'. Pre-war member William F Temple expanded on these groups in a *JBIS* editorial: the technical group were said to have joined the BIS 'to keep in touch with the latest research', whilst the idealists consisted of 'half-inarticulate lookers-on [who] believe that one day man will cross outer space to the planets'[2]. There seems to have been a general trend, starting with the idealists being the dominant group in the 1930s, through to the pre-eminence of the more

[1] Also referred to in this thesis as *JBIS,* the *BIS Journal* and sometimes just the *Journal.*

[2] Temple, W F (1939): 3

technically-minded members towards the end of the study period as perceptions of interplanetary science shifted, although it will also be argued that these two groups were inherently unstable and the boundary between them permeable. In order to find out what kind of people ran the Society, it helps here to give some basic biographical information about several key personalities in this study. As such, the following list is not representative of the BIS as a whole, but it is merely a reflection of some of the key protagonists of this thesis, who were all pre-war members of the BIS and maintained their involvement into the post-war years, some increasingly, some less so. This also raises the question of gender, to which I shall return, as the five people who have been identified are all men, and the narrative of the thesis as a whole makes women conspicuous by their absence.

Philip Ellaby Cleator (1908 - 1994)

> 'Agnostic, sceptic and pacifist - a one-time idealist whose disillusionment is now complete'[3]

Philip Cleator was the founder of the BIS, bringing together a small group of interplanetary enthusiasts at his house in Wallasey near Liverpool in September 1933. He was an engineer by trade, and inherited his parents' business which was operated from the same family home, whilst later in life he identified himself more as a writer. Cleator was the driving force behind the BIS in its first few years, publishing a comprehensive guide to interplanetary travel in his 1936 *Rockets Through Space*, and it is difficult to underestimate his influence on the astronautics movement in Britain. However, his authority within the BIS waned in the late-1930s, when control over the Society was taken out of his hands, and the centre of activity moved to London. During the Second World War Cleator was a conscientious objector, mindful as he was of 'a marked personal disinclination to plunge a bayonet into the

[3] Cleator, P E (1949): 210

body of a fellow man'[4]. Some of Cleator's characteristics can be ascertained from his writing style, which is demonstrated in a number of retrospective articles and letters commissioned by the BIS in the later years of his life. Such traits include a youthful enthusiasm, set against a dry sense of humour and witty command of the English language, whilst his agnostic, pacifist moral stance also becomes quite apparent.

Archibald Montgomery Low (1888 - 1956)

'A very nearly great man'[5]

A M Low was the second President of the BIS, from 1937 to 1939, and forged a reputation as an inventor and populariser of science during the inter-war years. A generation older than most of his contemporaries in the BIS, he attended St Paul's School in London around the turn of the century. Low had little academic success, preferring instead the practical aspects to science which he later took up at the Imperial College of Science and Technology[6]. He worked initially for his family business, The Low Accessories and Ignition Company, and was employed during the First World War as an experimental officer at the Royal Flying Corps. In this role Low was charged with producing a prototype guided missile, during which he learned about aspects of rocket propulsion that would relate to his later involvement with the BIS. However, the lack of a significant commercial breakthrough, alongside his rejection by a large part of the scientific establishment meant that he was subjected to 'much personal abuse and ridicule'[7] in the course of his career. As I shall explain, Low's sense of his own 'persona' was an important factor in the popularisation of the BIS and interplanetary

[4] Cleator, P E (1982): 25

[5] Brabazon of Tara, Lord (1958):12

[6] Mr. A M Low (1956): 11

[7] Obituary - Professor A M Low (1956): 351

science in general during the 1930s. He edited the magazine *Armchair Science* during this period, and Low's interactions with the world of popular science shall be examined carefully alongside his role in the BIS.

Arthur C Clarke (1917 - 2008)

> 'I have great faith in optimism as a guiding principle, if only because it offers us the opportunity of creating a self-fulfilling prophecy'[8]

Arthur Charles Clarke had an overwhelming life-long interest in interplanetary science which lasted from his childhood days in Somerset, during the time he spent living in London either side of the Second World War, right through to the final years in his adopted national home of Ceylon / Sri Lanka. Clarke initially worked as an auditor for the civil service in the 1930s, using his aptitude for arithmetic, whilst during the war he was stationed at Davidstow Moor in Cornwall, where he worked on radar systems for the RAF. On his return to London, Clarke read maths and physics at King's College London, and quickly became one of the most active and influential members of the BIS, twice serving as Chairman in 1946-47 and 1951-53. During this time Clarke was also writing on a prolific scale, and graduated from short stories in 'pulp' magazines to novels published on both sides of the Atlantic, as well as technical articles. He wrote around a dozen novels before his big break with the film-maker Stanley Kubrick in 1968, writing the screenplay to *2001: A Space Odyssey*. Whilst travelling the world on lecture tours and book promotions, Clarke developed an interest in underwater exploration, which led him to his adopted home of Ceylon / Sri Lanka, where he started living in 1956. Clarke became less mobile in his later decades following a severe attack of polio-induced paralysis, but still remained in the public eye with several high-profile novels and television programmes including *Arthur C Clarke's Mysterious World*, produced for Yorkshire

[8] Clarke, A C (2007) [5m04s]

Television in the 1980s. Clarke was knighted in 2000, was awarded the honour of 'The Pride of Sri Lanka' in 2005, and continued to engage enthusiastically with new technologies and space flight theories into his nineties.

Arthur Valentine 'Val' Cleaver (1917 - 1977)

'The man who should have been the British von Braun'[9]

Val Cleaver joined the BIS as a teenager in 1936, forming part of the London group of interplanetary enthusiasts that met regularly in London during the pre-war period. The same age as Arthur C Clarke, the two forged a lasting friendship, and they remained in contact long after the latter's emigration. An aerospace engineer by trade, Cleaver's occupation during the Second World War was to work on performance evaluation for aeroplane propellers, which led to employment with the de Havilland Propeller Company after the war[10]. Cleaver was influential in the policies of the BIS in the post-war period, acting as Chairman between 1948 and 1951. During this time he lobbied enthusiastically for greater international co-operation between the interplanetary societies around the world. Unlike many of his contemporaries in the engineering profession, Cleaver believed in the potential of the rocket motor and its application to space flight even before the war, when the prevailing thought was that the rocket was not a serious and effective means of propulsion. Cleaver also possessed the technical skills to help make such designs a reality when he joined Rolls Royce in 1956 as the Chief Engineer of their newly formed rocket team[11]. Cleaver was appointed OBE in 1965 for his contributions to rocketry projects such as the Blue Streak. It was around this time that he started a correspondence with the German / American rocketry expert

[9] Attributed to Clarke, A C, quoted in Parkinson, B (2008) (ed): 49

[10] Parkinson, B (2008) (ed): 49

[11] *Ibid.*: 49

Wernher von Braun, discussing aspects of space flight and their shared disdain for political interference in scientific matters[12].

Patrick Moore (1923 -)

'I'm not much of a rocket man myself'[13]

Patrick Moore is most widely-known in Britain as an astronomer and television personality. However, his involvement with the BIS is a subject that is relatively undocumented. Like many of his fellow BIS members, his interest in interplanetary science stemmed from reading science fiction stories as a child, and Moore joined both the BIS and the British Astronomical Association as an adolescent in the 1930s[14]. He served for RAF Bomber Command during the Second World War as a navigator, reaching the rank of Flight Lieutenant, and during his training had the opportunity to meet Albert Einstein and Orville Wright whilst on leave in New York. His 1953 *Guide to the Moon*, based on his personal observations, instigated his writing career, during which he produced a series of 'boys' novels' as well as a large number of factual books on astronomy and the solar system. It wasn't until 1956 that Moore brought the study of astronomy to the forefront of the activities of the BIS, when he was the inaugural editor of the BIS popular magazine *Spaceflight*. Moore's extensive knowledge of Lunar topography led to some of his charts being used by the Soviet Union in 1959 to correlate their own observations of the far side of the Moon. Around this time Moore also started to appear on television, and in particular the long-running astronomy series *The Sky at Night*. Moore was appointed OBE in 1968, CBE in 1988, and was knighted in 2001 'for

[12] Correspondence: Val Cleaver to Wernher Von Braun, 27/10/1959

[13] Interview with Patrick Moore, 2/11/09

[14] Moore, P (2003): 16

services to the popularisation of science and to broadcasting'[15]. In addition, Moore is an Honorary Fellow of the Royal Society and a Fellow of the Royal Astronomical Society. He continues to live in Selsey, West Sussex, where *The Sky at Night* is still filmed regularly, taking advantage of Moore's garden observatory and continued passion for astronomy.

Existing studies

There have been a handful of studies about the BIS in a number of different formats. The most informative has been the recently published *Interplanetary - A History of the British Interplanetary Society*[16]. This is a collection of relatively short pieces of writing by members of the Society on different periods in the organisation's history, edited by Bob Parkinson, who is the current President of the BIS. This account provides a great deal of information about the history of the Society, starting with its formation in 1933, going through the period of post-war reconstruction and onwards to document various institutional projects in recent decades. When researching the BIS I have attempted to look beyond this account for sources of information, but its value as a secondary source was important, not only when primary sources were unavailable, but also as a means of triangulating information from other sources. The book contains a number of interesting illustrations as well as short biographies of certain members of the BIS, and its tone is one of reminiscence, as its writers look back to periods in the history of the Society that they were involved with. Its review in the science fiction journal *Foundation* notes that 'the book's format ... length and position as an in-house publication precludes very much in the way of analysis of social context and individual motive, but as a primary source material it is invaluable'[17].

[15] BBC News (2000) [online]

[16] Parkinson, B (2008) (ed)

[17] Sawyer, A (2009) 123

An account of the BIS from a different perspective is offered by Frank Winter, in his pre-war history of the European and American rocket societies. Published by the Smithsonian Institution in Washington DC, this account 'relates how the societies and their members helped lay the groundwork for the true beginnings of what may be called "modern astronautics"'[18]. The book's title and key message point towards a 'pre-history' of space flight, and should be considered in relation to the Smithsonian's National Air and Space Museum, which displays artefacts from the feted American space missions of the 1960s and 70s. Winter's account is a well-researched and expansive study of the pre-war space flight societies, and includes one chapter on the BIS, alongside chapters on the American, Russian and German groups. This is essentially a chronological account of the development of the BIS from its inception through to the onset of the Second World War, and does contain some information that was unavailable at first hand in Britain, such as correspondence from the BIS to the American societies. It can therefore be read in a similar way to the institutional history of the BIS, whilst two independently researched accounts (Parkinson's book does not mention Winter's) are together useful in terms of confirming certain events and facts about the Society's history. As with Parkinson's account though, Winter's history does not go into the kind of detail that would have been possible for a full study of the BIS and its cultural connections.

One account of the BIS that does attempt to go into greater analytical detail is Alexander Geppert's journal article on what he calls 'space personae', the charismatic individuals who promoted space flight in the mid-twentieth century[19]. Examining the various German space flight societies and the BIS as they developed in tandem, this account, as well as providing useful factual information about membership numbers and publication records, explores the

[18] Winter, F (1983):13

[19] Geppert, A (2008)

characters of certain members of the European interplanetary movement including Philip Cleator, Willy Ley and Hermann Oberth. As such, Geppert accounts for 'a particular scientific type of person'[20] in pre-*Sputnik* space science, and explores the connections between such individuals, the media and the early technological advances of rocketry. Focusing on activities across Europe both before and after the Second World War, this is an important study that establishes the space flight societies as organisations that can be productively approached from an analytical perspective, and this thesis will draw on and elaborate on some of the themes that have been introduced here.

One final text which narrates histories of the BIS comes from contemporary popular science writing, in the shape of Francis Spufford's *Backroom Boys.* This volume recounts narratives of British scientific and engineering projects such as the discovery of the structure of DNA and the development of the Concorde airliner, and also contains an account of the BIS. Drawing on a handful of documentary sources and interviews, Spufford tells some of the stories of the Society, including an unlikely and somewhat distasteful scenario in which, having felt the impact of a German V-2 rocket whilst meeting in a pub in London during the war, 'the BIS rose to their feet and cheered'[21] at the apparent arrival of long-range rocketry. In accordance with the book's tone, some of the accounts are arguably subject to a certain amount of artistic license in this manner, as the writer tries to put together an engaging and entertaining set of stories about British eccentricity and ingenuity. This romanticising of the 'British Boffin' is an interesting trait in its own right, and is something that one should be aware of when recounting stories such as the history of the BIS.

[20] *Ibid.*: 265

[21] Spufford, F (2003) : 5

Structure of the thesis

None of the existing accounts of the BIS attempt fully to explore the Society's history in relation to its institutional discourses, geopolitical implications, interactions with cultures of popular science and wider imaginative representations, and this is what this thesis sets out to do. Before attending to empirical engagements, the thesis starts out with a literature review chapter, which is split into three sections: the first considers how and why geographers have started to engage with outer space, the second looks at exploration and internationalism in the twentieth century, and the third examines cultures of scientific knowledge. These sections attend to both the theoretical and historiographical contexts of the rest of the thesis, and place the research in its appropriate wider discourses. The next chapter focuses on methodology and sourcing, and provides a self-reflective account of archival work, interviews and textual analysis in the context of contemporary research in cultural and historical geography. Following on from this are four empirical chapters, which each deal with a specific theme in a loosely chronological manner. The first focuses on the emergent discourses of British outer space, involving the early years of the BIS in Liverpool, its subsequent expansion, as well as post-war patterns of amalgamation, professionalisation and historicisation. The second empirical chapter looks at the geopolitical connections of the BIS, including pre-war international networks of knowledge, the formation of international space flight organisations, as well as Commonwealth and European space projects. The next chapter looks at the popularisation of British outer space, including the pre-war popular science movement, and the post-war mediation of British space science. The final empirical chapter examines the imaginative representations of British outer space, through looking at fictional accounts by people who were associated with the BIS, such as Arthur C Clarke and *Dan Dare* illustrator Frank Hampson, as well as the intertextual connections of these works.

This is followed by a discussion of the themes covered in the thesis, which draws out some empirical and theoretical conclusions.

Chapter 2

Ways of Understanding British Outer Space

Before turning to the empirical chapters of this thesis, it is important to explore the ways in which the concept of 'British outer space' in the twentieth century can be understood from a geographical perspective. Doing this will place the research in a theoretical and historical framework that attends to not only the historiography of twentieth century Britain, but also to contemporary debates within cultural and historical geography. As such, this chapter is divided into three sections: The first deals with the ways in which contemporary geographers have approached outer space as a subject of enquiry, and will argue that cultural geography represents a natural academic home for the understanding of human interactions with outer space and their cultural implications. The second section examines geopolitical discourses of the twentieth century including the 'new' spaces of exploration, the inter-war emergence of internationalism as a potential successor to the Western European empires of the Victorian age, and Britain's search for a place on the world stage after the Second World War, examining concepts of Commonwealth and Europe. The final section looks at the different ways of understanding cultures of scientific knowledge, including work on locating scientific practice, as well as expressions of science by the state and in popular culture. It is hoped that these three sections, examining geographies of outer space, exploration and internationalism, and the role of science, will not only provide historical context for a study of British outer space, but also raise interesting questions about the directions of contemporary discourses in cultural and historical geography. This review shall also highlight the diversity of literatures that will inform this thesis, whose contents range from the vernacular spaces of the pub to the geopolitics of space exploration. This approach will address questions of what it means to consider such varied literatures of geography and history, which have been drawn

together in this thesis by a cultural movement that sought to bridge the divides between the arts and sciences in the mid-twentieth century.

How and why geographers have started to engage with outer space

Given that space flight became a reality mid-way through the twentieth century, it is perhaps surprising that modern human geographers had not considered outer space as a field of enquiry until the mid-1990s. Indeed, prior to geography's 'cultural turn' in the late-1980s, issues surrounding the wider cultural importance of representation and discourse had been neglected in the discipline of geography. Denis Cosgrove's landmark and often-cited paper about the Apollo space photographs[22] took this new study of representation to outer space and two iconic images of the Earth, whose significance in world-wide visual culture since they were taken in 1968 ('Earthrise') and 1972 ('Full-Earth') can hardly be underestimated. Whilst Cosgrove's paper could be described as a one-off contribution at the time, the past five years has seen a broader range of studies of the cultural and historical geographies of outer space. These studies have examined the implications of space exploration both in contemporary times, but have also looked back to the pre-cursors of such activities throughout the twentieth century, as well as fleetingly attempting to understand cultures of science by looking at fictional representations. Among these studies, there have been two significant 'calls' for engagement with outer space in cultural and historical geography, which I shall return to in the latter part of this section. Other studies have started to answer these calls in different ways, and have tended to focus on the early-twentieth century and the decades immediately following the Second World War for sources of information.

Starting with the more historical studies, Maria Lane has examined the activities of astronomers and cartographers of Mars around the turn of the twentieth century. At this

[22] Cosgrove, D (1994)

time, astronomers such as the Italian Giovanni Schiaparelli mapped the Martian surface using telescopic observations, and Lane postulates that well-established cartographic conventions not only rendered Martian landscapes more familiar, but also re-enforced the notion that Mars could be 'conceptually controlled'[23]. In this way, Lane demonstrates how representations of interplanetary space were able to draw upon familiar Victorian geographical discourses of mapping and exploration to legitimise claims to knowledge about the red planet. As such, displays of knowledge were not so much about truth or accuracy, but about command and authority, which in turn served to elevate the status of astronomers such as Schiaparelli. Lane has developed this approach to delve deeper into the ways in which late-Victorian astronomers attempted to be seen more as active explorers and geographers than passive, static observers. One such strategy helped to create a 'popular mania' at the turn of the twentieth century around the idea that Mars was inhabited by intelligent beings. Coinciding with H G Wells' influential Martian invasion novel *The War of the Worlds* (1898), astronomers such as Schiaparelli and the American Percival Lowell propagated maps of Mars showing 'canals' that were interpreted as signs of intelligent life on the planet. These maps were developed despite the fact that 'no astronomer saw, or claimed to see, an interlinked canal network while sitting at the telescope'[24]. Astronomers also sought to claim legitimacy for their work by emphasising the isolation and purity of remote locations such as the Sierra Nevada mountain range, where some observations were carried out. Whilst there may have been some scientific merit in adopting high-altitude locations for astronomical observation, due to lower atmospheric density and absence of urban pollution, the main power of these locations came through their representation as sublime landscapes. Thus, once the observations had been carried out, assertions of 'scientific manliness' and the

[23] Lane, K M D (2005): 499

[24] Lane, K M D (2006): 201

ability to 'confront and ably conquer wilderness challenges'[25] had the effect of further legitimising claims to astronomical knowledge. In this series of studies, Lane usefully combines the representational and practical aspects to interplanetary science, which, before the coming of age of rocketry, was centred around the observational science of astronomy.

The grounded cultural geographies of interplanetary science have also been examined by Fraser MacDonald in his recent series of contributions on post-war rocketry in Britain and America. Whilst the rockets in question were initially developed as ballistic missiles with the potential to carry a nuclear warhead, the post-war technology of rocketry is seen as inseparable from the development of space flight. Indeed, MacDonald argues that, when 'seen in the light of terrestrial geopolitics, the development of Cold War rocketry and the wider endeavour of space exploration become more obviously linked'[26]. As such, and drawing upon debates in critical geopolitics, this author has examined the tiny North Atlantic island of Rockall, charting the story of its annexation by Britain in 1955[27]. This act of territorial acquisition has been marked as the final expansion of the British Empire, as its status as a world power was declining. However, the geopolitical context for the annexation was largely related to the Cold War, and is intrinsically linked to the emerging British rocketry programme. MacDonald identifies fears that Rockall could be in some way used by the Soviet Union to track British test rockets fired from Uist in the Outer Hebrides. This was the principal reason behind the conquest, which consisted of a ceremonious planting of a flag, the setting of a plaque, and a short oral declaration. MacDonald examines the cultural production of this practice of territorial seizure, and surmises that the 'management of the news story in the

[25] Lane, K M D (2008): 141

[26] MacDonald, F (2010): 220

[27] MacDonald, F (2006b)

media *was* the act of annexation as much as the landing'[28], highlighting the importance of the media in geopolitical constructions[29]. Projecting this argument more explicitly to the geopolitics of outer space, MacDonald iterates that 'popular culture cannot be understood as "responding" to space exploration as much as being constitutive of it'[30]. This author has also looked at children's play and collecting as everyday practices that perpetuate geopolitical messages connected with space flight. He argues that toys such as interactive models of Britain's American-built 'Corporal' rocket, and a set of trading cards called 'Defenders of America' became important elements of Cold War practice – not only did the children who played with these objects enact simulations of Cold War events, but their experience bestowed upon the child a sense that the future belongs to them. As well as practical activities, MacDonald's appreciation for 'how geopolitical power is exercised through the experience of sights and spectacles'[31] is demonstrated by the experience of a 'space mad' boy who travelled across the highlands of Scotland to witness the test firing of a Corporal rocket from the isle of Uist in 1959. This forms a useful example of the locating of modernity in the landscapes of Cold War rocketry, and forms part of a trend which is repeated in other sites of rocketry and space exploration, whereby places of extreme remoteness such as the Outer Hebrides and the Western Australian desert[32] attain new value as locations for the testing of this kind of modern technology, and a mythological status as potential launch pads for the space age.

[28] *Ibid*.: 640 [emphasis in original]

[29] Cf. Sharp, J (1996)

[30] MacDonald, F (2008): 629

[31] MacDonald, F (2006a): 55

[32] Southall, I (1965)

One actual launch pad to outer space has been the subject of an extensive study by the anthropologist Peter Redfield. This author examines the Kourou rocket range in French Guiana with a distinct awareness of how scientific practice can be examined spatially, and how, by studying the rocket site as a 'fertile field of representation'[33], layers of meaning around the French and European space programmes can be excavated. This not only includes the geopolitical implications of sending a satellite into orbit in the Cold War era, but also highlights the elevation of French Guiana as one of the world's key equatorial launching sites. Redfield also attends to the social conditions within the village that sprouted next to the launch site, noting how the new settlement of Kourou reproduced 'an old colonialism in its racial divides reinforced by social class'[34], a tension that was replicated on a wider scale in the launching of European rockets and satellites from this Latin American state.

The lives of rockets and satellites once they have attained orbit has been the subject of a limited range of studies that directly examine the geopolitical agency of objects in space. This has included Matthew Godwin's study on the 'Ariel-1' satellite[35], which was built and launched by NASA, but contained British experiments, and became known as the first international satellite when it was successfully launched on the 26th April 1962. Godwin goes on to explain how the detonation of a hydrogen bomb 200 miles over the Pacific Ocean by the Americans on the 9th July that year affected Ariel-1's transmission and perpetuated a series of tense diplomatic exchanges between Britain and America. The geopolitical significance of certain orbital pathways has also been highlighted by Christy Collis in her study of the geostationary orbit, a belt of space 22,000 miles above the equator which allows a satellite to appear 'fixed' above a point on the Earth's surface. Collis indicates how this

[33] Redfield, P (2000): 148

[34] *Ibid.*: 139

[35] Godwin, M (2010)

most valuable orbital location remains 'a space of conflict, compromise and instability'[36] as a result of its complex and evolving legal geography. Moving beyond the realms of Earth orbit, a recent study by Jason Dittmer has considered the NASA 'Mars Pathfinder' missions of the late-1990s[37], which saw images from the robotic exploration of the red planet transmitted back to Earth and published throughout the world's press. Dittmer concludes that a language of colonialism saturated representations of Mars in the US media, implying that the planet would be a place fit for human inhabitation in the future.

Dittmer's paper on representations of Mars in the late-twentieth century nicely balances out Lane's studies of perceptions of the planet at the start of the century, and taken together these contributions demonstrate humankind's enduring fascination with interplanetary exploration, whether it be through the telescope or by remote robotic exploration. The highlighted studies also reveal how geographies of outer space often connect to a wide range of unexpected human behaviours and interactions on the ground, from the sublime representations of astronomical viewing-points through to the domestic and intimate geographies of children's play. To this effect Cosgrove has noted that 'physical human presence is not a pre-requisite for an extra-terrestrial human geography'[38], but I would take this argument a stage further by suggesting that, as made clear through some of the examples cited above, it is possible to construct a cultural geography of outer space whether this involves human-made objects leaving the Earth's atmosphere or not. In this way, a study of British outer space in the mid-twentieth century can contribute to such a geography, despite the fact that British attempts to reach outer space came to rely heavily on other nations after the Second World War, and were rarely taken seriously pre-war.

[36] Collis, C (2009)**:** 60

[37] Dittmer, J (2006)

[38] Cosgrove, D (2008): 47

Whereas the examples discussed so far have attended to the question of how scholars from a cultural geography perspective have started to engage with outer space as a field of enquiry, these contributions, whilst innovative and revealing in their different ways, have not specifically addressed the question of why outer space is something in which cultural geographers in particular should be interested. Since Cosgrove's landmark paper, there have been two attempts to address this question directly, one coming from MacDonald, the other from Cosgrove himself. The latter's *Apollo* paper took two photographs of the Earth from space as a starting point from which to examine peoples' perceptions of our planet as a whole in the late-twentieth century, identifying two modes of thought that adopted the images: Whereas a 'Whole-Earth' discourse emphasised organic unity, rootedness and the fragility of a corporeal Earth, and became associated with James Lovelock's 'Gaia' hypothesis, a 'One-World' discourse is also identified, representing an imperial spatiality of circulation, connectivity and communication[39]. As well as examining the late-modern implications of the Apollo photographs, Cosgrove places the images in a deeper historical context by exploring the genealogy of the global imagination in the western world. Drawing attention to the name of the pioneering Moon missions, what Cosgrove calls 'the Apollonian perspective' is traced back to the theme of spiritual ascent with the astronomer and mathematician Johannes Kepler's seventeenth century notion of the heavenly dream or *somnium*. Even further, the Apollonian perspective can be connected to 'the narrative of Christ as God-man, refracted through the heritage of Greece and Rome'[40]. This connection can be seen when examining the badge motif from NASA's Apollo 17 mission, which portrays a classical bust of Apollo against a lunar backdrop. In this context Apollo can be understood to embody 'a desire for

[39] Cosgrove, D (1994): 285

[40] Cosgrove, D (2001): xi

wholeness and a will to power, a dream of transcendence and an appeal to radiance'[41]. According to Cosgrove, these two thematic strands, summarised as 'humanity' and 'empire', have been 'braided together into a universalising teleology of western Christianity'[42] that still resonates in the twentieth century through the poetics of, at first, aerial flight, and, later, space flight and the Apollo photographs.

Cosgrove has since made telling contributions to the history of geography, outlining what he sees as the seventeenth century collapse of cosmography, whose adherents 'mapped spaces well beyond the surface of the Earth, recognising the inseparability of celestial and terrestrial forms and patterns'[43]. According to Cosgrove, the disintegration of cosmography was 'brought about in part by geographical discovery and a changing image of the Earth's surface', which is said to have 'excluded from geography scientific consideration of the heavens' ever since[44]. The cosmographical connection in geography has indeed waxed and waned over the years, and the more recent studies of the geographies of outer space highlighted above have re-animated old trends such as this. At the same time, cultural geographers have started to investigate the vertical dimensions of landscape, examining spaces both above and below the Earth's surface. With regards to the latter, Bruce Braun has introduced a concept of 'verticality' to the production of natural landscapes in late-Victorian Canada, noting how 'geology rendered the space of the Canadian state vertical'[45]. Drawing influence from this study, Heidi Scott has examined the subterranean spaces of colonial Latin America, calling for

[41] *Ibid.*: 2

[42] *Ibid.*: xi

[43] Cosgrove, D (2008): 34

[44] *Ibid.*: 10

[45] Braun, B (2000): 28

closer scrutiny of the vertical dimension in the understanding of landscapes[46]. Similarly, sub-marine spaces have received some attention, including the Arctic sea bed, which remains a site of significant geopolitical contest following the planting of a Russian flag in 2007[47]. Whilst highlighting the importance of geology and mineral exploitation, these studies of sub-surface spaces have adopted a similar approach to studies of outer space and the upper atmosphere, in that they have embraced three-dimensional notions of landscape and space. Further to these developments, Cosgrove has identified two recent trends that he thinks should encourage geographers towards rethinking the cosmographic connection by studying outer space from a contemporary cultural perspective. Firstly, the 'philosophical and epistemological shifts' in recent decades have 'weakened the tightly defined and policed disciplinary boundaries of modern scientific disciplines', opening up the sciences to sociological and cultural critical evaluation. Second, and at the same time, there has been 'a growing human presence (both virtual and actual) in spaces beyond the Earth', a presence which has become pervasive in modern communications across the globe, as just one example of our growing connectivity with outer space. These two factors, Cosgrove argues, should lead us towards 'a human geography of celestial space, a cosmography for the twenty-first century'[48].

Fraser MacDonald also has two reasons for why outer space should be a major concern of critical human geography: Firstly, in an argument that runs parallel with that of Cosgrove, he iterates that outer space has become an ordinary and everyday part of peoples' lives, and therefore should not be seen as remote, extraordinary and purely in the realm of science fiction. Technologies such as satellite navigation, weather forecasting and computerised

[46] Scott, H V (2008)

[47] Dodds, K (2010)

[48] Cosgrove, D (2008): 34 - 35

mapping are now commonplace and it is often taken for granted that space exploration has provided the impetus for such advancements. Second, MacDonald argues that geopolitics and outer space are intrinsically linked, and therefore critical geopolitics is the natural academic home for the study of space exploration. This argument follows the reasoning that outer space has been militarised, and that 'the colonisation of space, rather than being a decisive and transcendent break from the past, is merely an extension of longstanding regimes of power'[49]. MacDonald's work has also been influenced by the emergence of critical geopolitics, which in recent years has argued that, rather than being engendered in the confines of state departments and the diplomatic circuit, geopolitics is actively constructed through popular, everyday practices such as reading magazines[50] or watching action films[51]. In this way, MacDonald's argument for what is termed 'astropolitics' moves towards a popular geopolitics of outer space[52], incorporating the quotidian influence of outer space technologies with popular geopolitical cultures. As such, there are multiple reasons why geopolitics offers a useful way into studying the geographies of outer space, which could form part of a return to the cosmographic tradition of geography encouraged by Cosgrove, which would in turn be mirrored by studies of the sub-surface.

Complementing geographical studies of outer space has been a limited amount of work on the geographies of science fiction, which incorporates the question of how space exploration has been envisaged imaginatively by writers and artists in the twentieth century. Critical studies of science fiction have been active for a number of decades following the establishment of academic journals in the United States and Britain including *Extrapolation*

[49] MacDonald, F (2007): 614 - 615

[50] Sharp, J (1996)

[51] Dodds, K (2006)

[52] MacDonald, F (2010)

(est. 1959), *Science Fiction Studies* (est. 1973) and *Foundation: The International Review of Science Fiction* (est. 1972). Following in the wake of such publications, the disciplines of cultural studies, English studies and film studies have examined science fiction and its influence within popular culture. This has included studies of British science fiction television, and in particular two programmes which defined this genre in the 1950s and 60s. The first was *Quatermass*, written by Nigel Kneale and broadcast over three series in 1953, 1957 and 1958-9. The first truly popular BBC science fiction programme, it focused on the eponymous Professor Bernard Quatermass and his encounters with extra-terrestrial life forms in various parts of Britain. The series has recently been appraised as having revolutionised British television, and individual episodes have been noted for their representations of the physical and mental scars of war, the threat of mass-culture and the prospect of social alienation in British society[53]. In 1963 came the better-known *Doctor Who*, whose protagonist was able to transcend not only space but time as well, drawing influence from H G Wells' novel *The Time Machine* (1895). This programme has received substantial attention in the cultural studies literature, including interpretations of the series' antagonists, 'the Daleks', as representative of 'bad science' and 'the horrible end-products of the machine age'[54]. One other study has looked at how *Doctor Who* has 'drawn on antagonisms of gender and class to construct its own welfarist ideal'[55], and such accounts remind us of the rich sociological and political content that can characterise British post-war science fiction.

However, there has, as with studies of outer space, been a noticeable lack of engagement with science fiction in geography, with the one exception of Rob Kitchin and James Kneale's

[53] Rolinson, D and Cooper, N (2002)

[54] Cook, J R (1999)**:** 122

[55] Tulloch, J (2000): 364

relatively recent editorial collection[56]. The type of texts that have attracted the most attention from geographers in this manner are the post-modernist 'new wave' and 'cyberpunk' science fiction novels, written from the 1970s onwards by authors such as J G Ballard[57] and Neal Stephenson[58], typically depicting terrestrial, urban, high-tech scenarios set in the near-future, incorporating elements of *film noir* and classic detective stories. Alongside such accounts, a limited range of imaginative literary geographies of interplanetary spaces have also been appraised, including work on Kim Stanley Robinson's *Mars* trilogy, published in the 1990s. Here, Shaun Huston has examined how Robinson uses the idea of terraforming Mars into a habitable planet to explore ideas about the human production of nature[59].

As we can see, science fiction is an extremely diverse genre, and it can be seen how elements of the 'golden age' or 'magazine era' of science fiction have generally been understudied, certainly by geographers. This typically refers to the period from the 1930s to the 1950s, when a self-aware genre of science fiction emerged for the first time, influenced by Victorian-era 'scientific romances' from authors such as Jules Verne and H G Wells, as well as new advancements in science. In this period writers generally adopted a positive or even reverential approach to the future possibilities of science[60]. This reflects the context of the era in which they were writing, and the prospect of space flight in particular is one element of science fiction that this thesis will attend to in detail, given that space flight has become the central myth of science fiction, symbolising a sudden mind-opening shock for many science fiction readers whose minds were opened to a vast range of imaginative

[56] Kitchin, R and Kneale, J (2002) (eds)

[57] Taylor, J S (2002)

[58] Kendrick, M (2002)

[59] Huston, S (2002)

[60] Attebery, B (2003)**:** 33

possibilities[61]. Approaching science fiction and the prospect of space flight from a cultural landscape perspective would provide insights into the imaginative technological geographies that authors such as Arthur C Clarke envisaged. This would not only involve literary analysis, because science fiction is not restricted to the medium of text. Indeed, landscape illustrations often formed an important part of science fiction stories in magazines, which is a tradition that ultimately found expression through the comics format. Brian Attebury has also explained how scientific articles in popular magazines seemed to merge with the kind of stories found in science fiction 'pulp' magazines such as *Amazing Stories*, whilst advertising and letters from fans also contributed to 'a single continuous flow of information about the technological future'[62]. It has also been contended that science fiction isn't so much a genre as an ongoing discussion between writers, critics and fans, and a mode of writing which has seemed to exist 'at variance from the standards and demands of both the literary establishment and the mass market'[63]. In this way science fiction represents not just a genre of writing with predictable formats, such as romance or adventure, but a nebulous mass of creativity drawn from both the arts and sciences. This may be of further use to cultural geographers as they start to connect with concepts of audience engagement, as well as offering a useful set of source materials for looking at the ways in which different forms of representation, such as landscape painting and literature, can interact and bleed into one another.

Some have made a distinction between science fiction and its sister genre, fantasy, noting that science fiction describes things that could happen in the 'real world', whereas events

[61] Stableford, B (1986)

[62] Attebery, B (2003)**:** 36

[63] Mendlesohn, F (2003)**:** 1

depicted in fantasy stories belong only in the realm of the imaginary[64]. Whilst events such as the realisation of space flight can be interpreted in this way, this is not to say that fantasy writing is somehow completely separate from reality. Indeed, it has been argued that fantasy literature can also reflect the everyday realities of discourses such as Orientalism in Western society[65]. It seems apparent that the real differences between science fiction and fantasy are not quite so clear cut, and that certain factors such as the prominence of technology in the narrative, can be one way of distinguishing between the two styles. Another genre related to science fiction is alternate history, which asks the reader to accept a 'what if' scenario such as the computer being invented in 1855 (as in William Gibson and Bruce Sterling's *The Difference Engine* [1990]) or the Allies losing the Second World War (as in Philip K Dick's *The Man in the High Castle* [1962]). A recent set of studies on 'counterfactual geographies' have embraced alternate histories, explored unfulfilled territorial configurations, and considered utopias as on-going critiques of the present rather than a blueprint for the future[66]. Such studies have suggested that counterfactual methods could be used as a tool for historical geographers to explore notions of possibility, chance, undecidability and happenstance[67].

As this thesis focuses partly on intellectual engagements with space flight, it is natural that science fiction will form part of the source material, alongside other plans for space exploration that may have been presented in more 'credible' formats such as journals and scientific symposia. By approaching certain science fiction texts from a contemporary cultural perspective this thesis aims to uncover visions about how technology, and in particular the technology of space flight, was expected to change society in the mid-twentieth century. It is

[64] McAleer, N (1992): 139

[65] Balfe, M (2004)

[66] See special feature in the *Journal of Historical Geography* (2010), **36**(3)

[67] Gilbert, D and Lambert, D (2010): 245

important to examine these aspirational geographies irrespective of the extent to which they were realised in actuality, because science fiction writers 'create strange worlds by reference to familiar geographies'[68] based on actual events and circumstances. Barney Warf has encouraged scholars to examine science fiction because it 'force[s] us to appreciate the importance of turning points, critical conjunctures, accidents, wars, crises and sudden disruptions that interrupt the reproduction of social systems across time and space'[69], and this thesis aims to problematise space flight as such a technological disruption that helps us explain the relationships between science, nature and society in the mid-twentieth century.

In this section we have seen how geographers have probed technological and imaginative representations of interplanetary space, and have called for geopolitical and 'new cosmographic' engagements with outer space. Whilst these studies as a whole offer a framework from which geographers might continue to engage with this subject, it is a theme that remains somewhat under-studied. Cultural geographies of outer space could further focus on the celebrated missions of the twentieth century, including Apollo and the Soviet Union's space programme. Alongside such accounts, research into contemporary space exploration offers many potential objects of study, including the anticipated new wave of lunar missions from countries including China and India, and the increasingly complex orbital presence that humans have built up around the Earth since the start of the space age. At the same time, I would argue that by looking into the early development of interplanetary science in countries whose achievements in outer space are less feted, objects of study emerge that encompass more than just the milestones of interplanetary exploration, and therefore a different set of insights can be attained. Focusing on Britain around the onset of the space age also allows for analysis of how achievements in space exploration by the

[68] Hones, S (2002)**:** 156

[69] Warf, B (2002): 37

United States and the Soviet Union were absorbed and refracted by outer space enthusiasts and the general public, and how these milestones contributed to a popular culture of British outer space.

Exploration and internationalism in the twentieth century

Whilst the principal framework in which this thesis is placed is the emerging cultural geography of outer space, there are other contextual discourses in which a study of British outer space in the mid-twentieth century must be situated. Given that at least one of the empirical chapters of this thesis explicitly pays attention to the international networks that are invoked in interplanetary science, it is appropriate to examine some of Britain's connections with the rest of the world in the mid-twentieth century, a time when Britain went from being a global imperial power towards a period of relative decline on the world stage.

An appropriate starting point for this wide-ranging topic is the study of exploration in the twentieth century. Recent decades have seen an extensive body of literature emerge on the critical histories of exploration, whereby the practise of exploring has been conceptualised 'less as some impartial means of "discovering" the "unknown" than part of a powerful and enduring projection of western imperial interests onto other parts of the world'[70], and with a particular focus on celebrated British explorers such as James Cook and David Livingstone. In this way, the discipline of geography itself has been called into question, and the explorer accordingly characterised as the 'foot-soldier of geography's empire'[71]. Whilst such studies have tended to focus on the eighteenth and nineteenth centuries, there has been relatively little work by geographers on exploration in the twentieth century. This is a trend identified

[70] Naylor, S and Ryan, J (2010)**:** 1

[71] Driver, F (2001): 3

by James Ryan and Simon Naylor, who note how the earlier studies of exploration have tended to emphasise 'Conrad's discontinuity'[72] between the 'geography militant' of the nineteenth century and the twentieth century emergence of 'geography triumphant', whereby the age of exploration had come to a close, and all the blank spaces on maps had been filled. Contrary to such a suggestion, recent studies have focused on the twentieth century as a time when the practice of exploration flourished in many different ways. In the first instance, there were still a great deal of spaces to be probed by explorers in the twentieth century. Instead of 'new world' conquests or the incursion of continental heartlands, the remote and extreme places of the world became the subject of exploration. This included the polar regions and the infamous race to the South Pole in 1911-12[73], desert areas such as the Libyan Sahara[74], the 'oceanic wilderness'[75] and, ultimately, outer space. Furthermore, exploration no longer had a dominant association with imperial expansion, developing new motives such as scientific discovery, the search for increasingly scarce natural resources and the achievement of personal goals. In this way, 'far from being a throwback to an earlier era of exploration, feats of modern exploration during the twentieth century can tell us much about what is distinctively modern about our own world and its intersecting circuits of science, culture and communication'[76]. Looking at the exploration of outer space in the twentieth century is one way of contributing to such an endeavour, whether the motives are revealed to have been essentially nationalistic or reflect a purer desire for scientific discovery about our universe. In any case it is important to note the increasing connections between science and exploration as we move into the twentieth century, whilst spaces of

[72] Naylor, S and Ryan, J (2010): 10

[73] Yussof, K (2010)

[74] Thomas, N and Hill, J (2010)

[75] Kroll, G (2008)

[76] Driver, F (2010)

exploration became less accessible and the practice of exploring became more reliant on technology.

One contextual development that might inform such a debate into the role of exploration in the twentieth century is the emergence of internationalism as an increasingly dominant mode of geopolitical engagement among and between states and private groups across the world[77]. Around the turn of the century, and continuing after the end of the First World War, international organisations emerged serving a number of different purposes. These ranged from privately financed institutions seeking to promote idealistic projects such as an international map of the world[78], through to inter-governmental groups like the League of Nations, which aimed to secure peace in Europe and around the world following the First World War and the subsequent Treaty of Versailles. One way of explaining this move towards such projects is to frame internationalism as a replacement for the declining Western European empires. As such, instead of global lines of trade and power radiating outwards from metropolitan centres such as London to the far-flung corners of empire, we have 'a more benign form of cooperation between cohabiting (rather than competing) states'[79]. Recently, however, it has been argued that internationalism in the late-nineteenth and early-twentieth century was more a product of changing imperial ideals than a replacement of Euro-centric empires[80]. Either way, it is important to take note of the increased sense of internationalism in this period and its associated advancements in transport and communications technologies, from intercontinental railways and oceanic telegraph connections through to the development of powered flight, which facilitated international

[77] Navari, C (2000): 1

[78] Pearson, A *et al.* (2006)

[79] Legg, S (2008): 240

[80] Trentmann, F (2007)

commodity trade, whilst also opening up new possibilities for other forms of global cooperation.

Following in the wake of such developments came a movement towards scientific internationalism, which has been examined for both the inter-war period and the immediate post-war years. In this vein of work, Paul Forman has looked at the science of quantum physics in Weimar Germany, which conformed to 'an ideology of scientific internationalism' based on the 'necessity of supranational agreement on scientific doctrine'[81]. However, Forman goes on to identify a strand of deeply felt nationalistic sentiment associated with inter-war science in Germany, despite such pretensions of internationalism. Further to this, he also explains a more fundamental tension between what he calls the 'republic of science'[82], that is, a notion that scientific knowledge occupies some space conceptually above the arbitrary divisions of nation states, and the specific national contexts in which scientific practise must develop.

The phenomenon of scientific internationalism has also been examined in the post-war period, specifically in relation to certain events. The 1957/58 International Geophysical Year (IGY)[83] was described at the time as an 'assault on the unknown'[84] and no less than 'the biggest and most intensive programme of research ever attempted by man'[85]. This global scientific project was devised as a successor to the International Polar Years of 1882-3 and 1932-3, but with the more ambitious goal of studying the Earth as a whole, and as such represented 'an unprecedented example of international scientific cooperation and

[81] Forman, P (1973): 155

[82] *Ibid.*: 153

[83] See special issue of *Journal of Historical Geography*, (2008) **34**(4)

[84] Collis, C and Dodds, K (2008)

[85] Gatland, K W G (1957): 130

idealism'[86]. Realms that were studied at the IGY primarily consisted of the Antarctic continent, the ocean floors, the upper atmosphere and outer space. As well as pushing back the limits of the knowable surface of the Earth through scientific exploration, these arenas facilitated the technical development of new areas of scientific knowledge, including geomagnetism, ionospheric physics and oceanography, not to mention the onset of space flight. Some of the notable achievements of the IGY included the detection of the upper-atmosphere Van Allen radiation belts, which have important implications for space flight, and the discovery of mid-oceanic ridges, which supported the theory of plate tectonics. Also recently appraised has been the Atoms for Peace conference that took place in Geneva in 1955, bringing together European, American and Soviet scientists under the auspices of the United Nations to share knowledge related to nuclear power generation and to promote 'the benign wonders of the atom'[87]. However, far from offering a blueprint for a scientific utopia, there has been a general consensus that the motives behind both the IGY and Atoms for Peace had more to do with geopolitical cultures of distraction, surveillance and territorial nationalism. As such, the Atoms for Peace conference has been described as a 'panopticon' whereby information about nuclear technology was closely guarded and traded[88], whilst various forms of scientific discovery in the Antarctic during the IGY have been portrayed as a veil for nationalistic geopolitical interests in the Earth's last unclaimed continental territory[89].

In this way, the discontinuities between the nation state and the concept of internationalism are brought into focus both before and after the Second World War, and the subsequent escalation of nuclear stockpiling and proliferation in the 1960s points towards this failure of

[86] Howkins, A (2008): 596

[87] Krige, J (2006): 176

[88] *Ibid.*: 167

[89] Naylor, S *et al.* (2008)

internationalism, as does the fizzling out of other idealistic projects including the international map of the world in the 1970s[90]. In relation to this, one of the aims of this thesis is to ascertain the extent to which this concept of scientific internationalism prevailed in relation to British interplanetary science. This will in turn address questions of the place of scientific knowledge, in what ways interplanetary science may have been considered to be in some way separate from geography, and how its relationship with the state was played out.

One additional geopolitical factor which has to be considered in this context is Britain's diminishing status from imperial authority to second-tier actor on the world stage. As we shall see in the later section, there is a more nuanced debate to be had about whether or not Britain in the immediate post-war era can be considered as a nation in decline. In any case, it is difficult to argue against the assertion that, by 1940, the First World War and the Great Depression, alongside anti-colonial independence movements in countries including Ireland and India, had 'robbed the British Empire of its romantic allure'[91]. Furthermore, during the Second World War, Britain's long-standing economic reliance on the United States was initiated by the Lend-Lease Act. This involved American aid being poured into Britain from 1941 to 1945 in the form of finance and military hardware, and was to be slowly paid back throughout the remainder of the twentieth century. A telling signal of the toll that the war took on Britain's economy at a domestic level is highlighted by David Kynaston, who has examined the extent of post-war food rationing in Britain, noting how meat, cheese, fats and sugar were all still on the ration as late as 1950[92]. These economic and resource-based pressures are important to bear in mind when considering Britain's changing geopolitical stance in this period.

[90] Pearson, A *et al.* (2006): 149

[91] Weight, R (2002): 63

[92] Kynaston, D (2007): 510

Debates around Britain's global role were also reflected in terms of defence capability. Following the Second World War, Britain went through a re-armament programme involving the continuation of conscription and the maintenance of standing reserves of armed forces, a process that culminated with the 1950-53 Korean War. However, whereas this conflict drew upon the resources of broad global alliances, the Suez crisis in 1956 made the decline in Britain's international standing painfully obvious. This event was much more than just an international dispute over rights to the Canal, and came to represent Britain's decline as a world power in the twentieth century. Indeed, according to the cultural historian Richard Weight, Suez 'undermined the national confidence created by Britain's victory in the Second World War, confirmed America's hegemony and began the long and tortuous process by which the British attempted to find a new role in Europe'[93].

Following Suez, and with the escalation of nuclear technology, Britain sought to re-establish itself on the world stage by building a hydrogen bomb. Having already developed an independent nuclear deterrent in the form of the Blue Danube free-fall atomic bomb, which became operational in 1953, Britain pushed ahead with the successful testing of the more powerful H-bomb in 1957 off the north-western coast of Australia[94]. Public reaction to this testing came largely in the form of the Campaign for Nuclear Disarmament, whose adherents ranged from middle-class mothers to Labour Leftists, with its roots in the tradition of Romantic protest[95]. Flying in the face of such protestations, the intention was to use the new H-bomb in conjunction with the home-grown Blue Streak rocket, which was designed in 1955, and was emblematic of what has been termed 'British defence futurism'[96] in this

[93] Weight, R (2002): 274

[94] Clark, I (1994): 36

[95] Veldman, M (1994): 125

[96] Edgerton, D (2006): 232

period. However, despite such intentions, Britain's ambitious nuclear rocket project was superseded by the US–UK Mutual Defence Agreement of 1958, which allowed for an unprecedented sharing of nuclear technology. Since this treaty, the British nuclear deterrent has been reliant on American hardware such as the submarine-based Polaris missile system from the 1960s, and the subsequent Trident system that still operates today.

As well as developing a somewhat subservient relationship with the United States during the early post-war years, the British outlook on the rest of the world also involved a renewed sense of what it meant to belong to a post-imperial Europe and also deal with the practical disintegration of the British Empire. At this time, Britain trod an uncertain path between the United States and Europe, which was ultimately reflected in the French President Charles de Gaulle vetoing Britain's application to join the European Economic Community in 1963. This was mostly due to French hostility at the idea of an 'Atlantic Europe' that would be too heavily influenced by the United States[97]. This type of anti-American Europeanism propagated despite the importance of the North Atlantic Treaty, which was signed by the United States and Western European countries in 1949 to oppose a perceived threat from the Soviet Union and its balancing influence on Eastern Europe. Whilst international groups and alliances in the immediate post-war period started to crystallise in this manner, another important development was the emergence of a 'modern Commonwealth' following the 1947 independence of India and Pakistan from British rule. This moved the constituents of the old British Empire towards a 'new type of association' based on equality of races and equality between countries[98], instead of the hierarchical relationships that characterised established notions of empire. Both of these changes, regarding Europe and the Commonwealth, are important to understand because they represent a shift in Britain's

[97] Heffernan, M (1998): 212

[98] Craggs, R (2009): 1

geopolitical stance from a position of primacy towards adopting a different and more complicated set of geopolitical outlooks.

A study contextualised by Britain's place in the world in the twentieth century must take account of these global-scale developments, in which different types of internationalism intertwined in interesting ways, from individual groups and scientific organisations operating on transnational scales, to strategic blocs and other assemblages of nation states. These can be seen alongside the emergence of a new kind of exploration that saw science as its driving force and ultimate goal, through which tensions between idealism and pragmatism always rose to the surface. It is one of the aims of this thesis to explore the ways in which global issues such as these interacted with cultures of British outer space.

Approaching cultures of science

Alongside the context of Britain's global role in the twentieth century, contesting considerations of how to theorise scientific practise are also important, which range in this section from Bruno Latour's networks of science and knowledge through to the room-level details of scientific environments and the importance of the social and geographical context of science. Theoretical approaches such as these will be considered alongside the historiographical context of cultures of science in mid-twentieth century Britain. This contextual backdrop extends into the realm of popular culture and two key events which shaped Britain's reaction to science, technology and modernism in the formative period of the early-1950s.

Whilst the first section of this chapter provides a rationale for the geographical approach that this thesis adopts, emphasising the relevance of space, landscape and geopolitics to cultures of science, it is still important to be aware of non-geographical approaches to understanding scientific practice. Histories that are relevant to cultures of British outer space have been

written on topics including British rocketry[99], the 'space race'[100] and astronomy[101] in the twentieth century. In addition, historians of science have examined broader scientific cultures in a number of interesting ways. This has included Rebekah Higgitt's re-appraisal of Newtonian biography in the nineteenth century, examining various accounts of Newton's life that provide insights into the development of the scientific method[102]. Also looking at the nineteenth century, James Mussell has examined the periodical press, with the intention of 'locat[ing] these hybrid texts once more in a complicated network of both people and things'[103]. These two approaches demonstrate a contrast between the biographical and object-based methods of studying histories of science, debates that have been picked up on by geographers in recent years.

One way in which science has been studied by geographers in recent years has stemmed from Latour's work on laboratory life[104] and the field of 'science studies'[105] which developed during the 1980s. These studies, and those that followed, have become highly influential to contemporary human geography. Latour was interested in the perceived division in academia between 'nature' and 'culture', and he saw the laboratory as a key site in which this relationship is negotiated. Latour and his colleagues became ultimately convinced that the paradigm which separated nature from culture was misleading, and that everything was, in fact, a 'hybrid' containing elements from each side of this ill-conceived division. One of

[99] Hill, C N (2001)

[100] Breuer, W (1993)

[101] Edge, D and Mulkay, M (1976)

[102] Higgitt, R (2007)

[103] Mussell, J (2007): 13

[104] Latour, B and Woolgar, S (1986)

[105] Latour, B (1987)

Latour's seminal works was on the nineteenth century French scientist Louis Pasteur. Latour examined the way in which Pasteur conducted his experiments into animal vaccines, and was particularly interested in Pasteur's re-location of parts of his laboratory onto a farm in which the vaccines would be tested. Thus, applying the concept of hybridity to Pasteur's work, 'any clear distinction between the laboratory and the farm begins to break down'[106], in opposition to any pre-conceived ideas that the laboratory represents 'culture' and the farm 'nature'. In attempting to bring all things nature and culture under one roof, Latour contests that human beings are not the sole purveyors of agency in our world: objects such as Pasteur's bacteria are given agency, just as the scientists who have produced them. In other words, 'all entities are assembled "symmetrically": that is, the "natural" entities are just as likely to be active as those labelled "social"'[107]. Latour's approach to the division of the natural and the social is pertinent to one of geography's enduring questions, the relationship between the human and the natural world, and his concept of hybridity is one which has been developed by geographers interested in the agency of the natural environment.

As well as biological agents like the bacteria, Latour encourages us to examine machines and instruments as non-human actants. For example, 'a picture of the moon valleys and mountains is presented to us as if we could see them directly'[108]. Without the telescope that was used to make the picture, we would not be able to see the image, even though the telescope is an *invisible* actant to the observer of the final image, which is thus a hybrid of human operator, scientific instrument, and the paper or screen on which it is viewed. It is through this set of relationships between 'actors' that Latour arrives at the concept of the network, and what became known as actor-network theory. It is the spatial aspect of the

[106] Murdoch, J (2006): 5

[107] *Ibid.*: 12

[108] Latour, B (1987): 69

network which has attracted geographers to adopt the theory, and to approach what Jonathan Murdoch has called a geography of heterogeneous associations between social and material entities[109]. The 'heterogeneity' of these networks challenges some of the questions of scale that have interested geographers. Latour uses the example of a train track to illustrate something that can be simultaneously be local and global, as a point on the track is always fixed locally in space, as well as being part of a network that stretches across continents. Thus, networks are 'capable of helping us navigate a world which … unfolds by way of mediation, transformation and circulation'[110]. Drawing on the work of Michel Foucault, Latour puts scientists in a position of power. They are the ones who create order out of disorder, in the process of conducting experiments in the controllable environment of the laboratory. Here, the scientist's work 'is reified and becomes part of the tacit skills or material equipment of another laboratory'[111]. The scientist's power also extends beyond the confines of the laboratory, as his or her truth claims 'set out the norms of conduct that enable distant events and people to be governed at arm's length'[112]. In this way, Latour's networks move beyond Foucault's notions of power within confined institutions such as the prison and asylum, to spaces that are co-ordinated on a more extensive basis[113].

Applying some of Latour's approaches to scientific networks, Jon Agar has examined the site of Jodrell Bank, a set of radio telescopes that were established in Cheshire shortly after the Second World War[114]. Here, the iconic Lovell Telescope, alongside other instruments,

[109] Murdoch, J (1997)

[110] Bingham, N and Thrift, N (2000)**:** 292

[111] Latour, B and Woolgar, S (1986): 239

[112] Rose, quoted in Allen, J (2003): 141

[113] Murdoch, J (2006)

[114] Agar, J (1998)

detected radio emissions from the depths of the universe, contributing towards our understanding of cosmic phenomena such as quasars and meteors, as well as playing an important role in tracking the early artificial satellites. Agar examines both the production and consumption of the science of radio astronomy at this site, and, taking the Second World War as a major influence in the development of post-war technology in general, networks are identified between the military, scientists, civil servants and engineers, connections that formed during the war and helped foster a national technological community. Agar goes on to argue that the spectacle of Jodrell Bank was just as important for British culture as the actual work on radio astronomy was for the scientific community. Here, alongside the agency of the Lovell Telescope, presented as an 'inquisitive giant'[115], the importance of the public perception of the scientist is also noted. In this way the cultural production of the site is examined, as well as the networks of knowledge that led to its creation, through examining Jodrell Bank's relationship with the press, the public and the government. Although this approach extends Latour's concept of the network to incorporate wider cultural factors connected to Jodrell Bank, it is perhaps lacking in its examination of the more personal and unceremonious spaces of social interaction that have provided insights into other spaces of science and industry. Furthermore, Agar runs the risk of succumbing to what Eric Laurier and Chris Philo have called 'the distracting glitter of certain kinds of objects'[116] that would ultimately have the effect of de-humanising the geography of science.

The value of considering the less conventional spaces and objects of science is demonstrated by the work of Anne Secord, who has examined the practices of artisan botanists in early-nineteenth century Lancashire[117], and Jenny Uglow, who has extensively studied the activities

[115] *Ibid.*: 98

[116] Laurier, E and Philo, C (2003): 88

[117] Secord, A (1994)

of the Lunar Society from 1780 to 1810, a group of amateur scientists and engineers who met monthly at each others' houses in the English West Midlands, when the light of the full moon would help illuminate their way home[118]. These groups' interactions in public houses and other informal spaces were central to scientific practices such as the identification of plant specimens, whilst the role of the publican was particularly significant in some cases, providing supporting facilities such as the keeping of records and cash. These studies connect to work in historical geography by David Livingstone, who argues that the location of scientific endeavour is central to the conduct and content of science[119], and Charles Withers, who has examined the geography of science in nineteenth and early-twentieth century Britain[120]. These contributions have, in turn, been influenced by the work of Steven Shapin and Simon Schaffer, who problematised the notion of experiment with reference to Robert Boyle's air pump in seventeenth century England. For them, in order to understand the nature of experimental practices, it is important to place the scientific method, and controversies about it, in both a social and geographical context[121]. This brings us back to the importance of the human in human geography, and the somewhat neglected influence of personalities, friendships and social relations in the formation of scientific knowledge, themes that this thesis aims to develop.

As well as drawing attention to certain methodological or theoretical issues, as highlighted above, Agar's study demonstrates how Jodrell Bank came to embody the national identity of Britain as a progressive and scientifically advanced nation. This has contributed to a debate which has ostensibly placed a view of Britain in post-war industrial and economic decline

[118] Uglow, J (2002)

[119] Livingstone, D (2003)

[120] Withers, C (2010)

[121] Shapin, S and Schaffer, S (1985): 14

against that of a twentieth century boom in British technology. The so-called 'declinists', including the military historian Corelli Barnett, have argued that Britain became over-stretched following the Second World War, and that the socialist Labour government of 1945 rose to power upon a wave of optimism and the seductive analogy of what could be done in war, and therefore what could be done in peace as well[122]. Ultimately, they say, Britain failed to live up to those dreams, burdened by the weight of Empire abroad and war-crippled productivity at home. Barnett criticises the landmark 1942 Beveridge Report as an example of this over-optimism, for placing ethics and ideals (such as the welfare state and the National Health Service) before resources. Martin Wiener also criticises the rise of post-war socialism in Britain as part of a wider critique of anti-industrialism and anti-commercialism in British society since the mid-nineteenth century[123]. Wiener's Thatcherite account amounts this post-war political movement to an anti-capitalist shift, which strangled the essence of the industrial revolution and Victorian / Edwardian industrialism in which British technological development had thrived. Thus, Wiener concludes, 'British retardation'[124] is what was faced with in the late-twentieth century.

These writers also criticise traditional representations of British heritage, which they say were still a dominant motif in post-war society, and characteristic of an anti-technological society. As such, Robert Hewison has noted that the nostalgic view of the national heartland, the English countryside, had become a central expression of national identity in the 1940s. Drawing on Patrick Wright's notion of 'Deep England'[125], Hewison intimates that this concept was 'constructed as much out of folk memories, poetry and cultural associations as

[122] Barnett, C (1986)

[123] Weiner, M (1981)

[124] *Ibid.*: 167

[125] Wright, P (1985): 81

actuality'[126]. This sentiment is recognised by David Edgerton[127], who notes how the prevailing view of the British air war was dominated by the image of the 'heroic, aristocratic pilot', as opposed to the mass-produced and highly effective bombers which brought Nazi Germany to its knees. Richard Weight has also commented on this conception of English rural romanticism, stating that this view has been 'grossly exaggerated'[128], whilst noting that the 1940s and 1950s were in fact the golden age of the more modern seaside resort and holiday camp. Along similar lines, David Matless has promoted a more progressive view of landscape in this period, which held the modern and the traditional in alignment, as complementary elements of national identity[129]. These exchanges demonstrate the lack of recent consensus in what people thought of as quintessentially British in the post-war years. This debate is essentially linked to the question of how to define the 'spatial fabric of the modern'[130] in post-war British culture, and in particular how much this involved looking to traditions of the past, and how this was linked to the conceptualisation of Britain as a progressive nation.

Another aspect of the argument concerning the nature of British modernity has emerged partly as a response to the declinist argument, which prevailed in the 1980s, yet still has some resonance in recent years. The key proponent of this argument is Edgerton, who proposed that England was above all a 'militant and technological nation' during the mid-twentieth century, consolidating the viewpoint that the Second World War had served as a stimulus to science-based industries. Examining the aircraft industry[131], Edgerton counters

[126] Hewison, R (1997): 23

[127] Edgerton, D (1991)

[128] Weight, R (2002): 159

[129] Matless, D (1998)

[130] Gilbert, D *et al.* (2003): 3

[131] Edgerton, D (1991)

the claims of the declinists, and demonstrates how England was committed to the development of the armed forces, science, technology and industry, by looking at comparative spending figures and governmental organisation from the start of the twentieth century. Others have recognised the massive re-armament programme that Britain undertook around the outbreak of the Korean War in 1950[132], and Edgerton frames his response to the post-war state not with the declining British commitment to Empire, but with the onset of such conflicts, which occurred in the wider theatre of the Cold War. Edgerton maintains that aeroplanes represented the modern side of English heritage, and that some of the technical characteristics of these aeroplanes were transferred to the development of space technology[133]. Historiographical debates about the nature of post-war Britain continued throughout the 1990s, some criticising Edgerton's conception of the British approach to warfare as 'liberal militarism'[134].

Edgerton has more recently broadened his argument beyond the scope of the aeroplane industry, in a wider attempt to account for 'the scientisation of Britain'[135], and whilst acknowledging the influence of the welfarist histories, he ascertains that Britain in the mid-twentieth century should be viewed more as a warfare state than as a welfare state. This idea is linked to the nationalisation of British industries under the post-war Labour government, and it is claimed that an 'expert state' had been in place since the inter-war years, which formed the basis for a military-scientific complex at the heart of the post-war British government. Supporting this argument, Becky Conekin *et al.* identify 'a quantitative expansion of experts and their forms of knowledge' in the immediate post-war period, and

[132] Hewison, R (1997)

[133] Edgerton, D (1991): 100

[134] Peden, G (1992): 104 - 105

[135] Edgerton, D (2006): 3

that such men and women were frequently portrayed as 'the torch-bearers of modernity'[136]. Edgerton's arguments revolve around government spending figures and organisational structures, and succeed in shedding light on the state of government and industry in the post-war era. However, what this argument lacks is thorough examination of non-official cultural practices and representations which would form a more complete picture of society and its trends in this period.

Certain significant events in post-war British culture have received substantial attention from historical geographers and cultural historians in recent years, and such studies have attempted to negotiate the tensions between traditional notions of British heritage and a more progressive view of British cultural identity, bringing the wider debates highlighted above into focus. One such event was the Festival of Britain in the summer of 1951, marking the centenary of the 1851 international Great Exhibition in London. The main attraction of the 1951 Festival was the exhibition complex on London's South Bank, looking out over the Thames towards the iconic Houses of Parliament. Several writers have examined the Festival's focal point as an indication of the wider feel of the country and its progress, following the end of the Second World War and six years of a Labour government that had promised reconstruction and the introduction of a new welfare state. The Festival was intended to offer some light relief to the British people, whilst both celebrating the recovery of Britain from the past war[137], and offering a glimpse into what they could expect in future years. It was well-attended, with the South Bank exhibition attracting over eight million visitors[138]. Weight has identified that the dominant theme of the South Bank exhibition was 'that the national past was the touchstone to the future … [and that] against [the]

[136] Conekin, B, *et al.* (1999): 14

[137] Addison, P (1985): 207

[138] Conekin, B (2003): 4

background of thriving tradition, the Festival celebrated modern industry and technology'[139]. A look at the range of exhibits[140] confirms this combination of themes based on British culture. Here, features such as an exhibition on 'The Land of Britain' and 'The Lion and the Unicorn' pavilion celebrated history and tradition. At the same time, the Dome of Discovery, which not only looked like a flying saucer straight out of a science fiction film, but also contained its own Outer Space exhibit, was deployed alongside the futuristic Skylon tower and modernist sculptures by Barbara Hepworth and Henry Moore, establishing a newer, more forward-looking counterpoint.

Most writers agree with this assessment of a combination of the traditional and the modern, but there has been some debate as to which of these themes represented the essence of the Festival. Hewison is of the opinion that the Festival was not as progressive as was suggested both at the time and in retrospect, and maintains that 'the modernist architecture was a lightweight framework for yet another exploration of Deep England'[141]. The main thrust of the exhibit, he argues, consisted of the prevailing ideas of land and the people, not the progressive architectural and design elements to which other commentators have given prominence. In contrast, Conekin focuses on the futuristic modernism of the South Bank exhibit, and argues that the Festival 'betrayed surprisingly little nostalgia … [whilst] science and planning were evoked as the answers to the question of how to build a better Britain'[142]. Cultures of science are also picked up on by this writer, both through the use of scientific expertise in the modernist design of the Dome of Discovery and Skylon structures, but also through the 'festival pattern' design of some of the interior decorations, which were based

[139] Weight, R (2002): 198 - 199

[140] Cox, I (1951)

[141] Hewison, R (1997): 59

[142] Conekin, B (2003): 46

on atomic structures, inspired by the latest scientific advances. Here, the two arguments focus on different aspects of the exhibition. Matless acknowledges the presence of history and tradition in the South Bank exhibit, but incorporates this representation into a wider feel that the Festival was 'perhaps the fullest expression of a progressive sense of landscape and citizenship'[143], echoing arguments outlined above concerning the compatible nature of tradition and progression in conceptions of national identity.

As well as national infrastructural showcases, the Festival presented visions of the modern British home, which gave visitors 'a glimpse of a more colourful, affluent lifestyle'[144] which was missing whilst the nation recovered from the war. These promising images foretold the consumer boom of the later 1950s, which was partly put into motion by the installation of a Conservative government in late 1951, which promised to end austerity and 'set the people free'[145]. This change came in the wake of concerns about the limited availability of consumer goods, which were on display both at the 1951 Festival, and also at the earlier 'Britain Can Make It' exhibition, which opened at the Victoria and Albert Museum in 1946. Referencing Churchill's famous wartime motto 'Britain can take it', the branding of the exhibit underwent a further perversion in the popular press, as it was referred to as the 'Britain can't have it' exhibition. This was because the exhibit tantalizingly displayed household goods that were unavailable to British people, as they were reserved for export as part of an attempt to bolster the British economy [146]. This social context is important in understanding the tensions around the notion of austerity in post-war Britain, and the extent to which this was related

[143] Matless, D (1998): 267

[144] Weight, R (2002): 206

[145] *Ibid.*: 211

[146] Addison, P (1985): 192

to, and may have been more relevant to the British public than, the visions of technological modernism represented by some aspects of the 1951 Festival.

It could be argued that the rejection of Clement Attlee's government in the general election of October 1951 was also a rejection of the modernist ideals represented in part by the Festival of Britain. Indeed, Conekin suggests that 'many found in the Coronation Day celebrations two years later a more reassuring balance of the modern and the quintessentially British'[147]. Weight documents the intrinsic connection between the British monarchy and national identity, stating that, in the 1950s, the monarchy was 'as much about the invention of modernity as it was about the invention of tradition'[148]. As such, what Conekin *et al*. have called the 'amalgamation of the traditional and the self-consciously modern'[149] that was also manifested in the Festival of Britain, was expressed through the more familiar and reassuring mode of monarchism, which was brought to prominence with the Coronation of Queen Elizabeth II on the 2nd June 1953. The essence of this combination of the modern and traditional was realised through the direct association of Queen Elizabeth and the Duke of Edinburgh with modern technology. This was reflected in the manner of Elizabeth's succession to the throne in February 1952, and her Coronation in June 1953. The young Queen was touring Kenya with the Duke of Edinburgh at the time of succession, and became the first British monarch to arrive in her capital for the first time by aeroplane, an event which Weight calls 'a potent symbol of modernity'[150]. Furthermore, the Queen's Coronation was televised live to the nation, an unprecedented event which gave Britons

[147] Conekin, B (2003): 226

[148] Weight, R (2002): 212

[149] Conekin, B *et al.*(1999)

[150] Weight, R (2002): 232

watching at home ‘a better view than the peers in Westminster Abbey’[151]. Hewison, whilst negating the significance of the modernist elements to the 1951 Festival, concedes that ‘the most modernising aspect of the Coronation itself was the recognition of the importance of the mass media’, noting that ’20.5 million people, 56 per cent of the adult population, watched the ceremony on television’[152].

Some have considered the Coronation as the beginning of a movement known as ‘New Elizabethanism’, which, according to Weight, represented ‘a conservative definition of how progress could be achieved in post-war Britain’[153], and manifested itself through a general culture of progressive monarchism, as well as organisations such as the Elizabethan Party and the Young Elizabethan magazine. The name implicitly refers to the reign of Elizabeth I, which was thought of by some as a Golden Age in English history. The implication was that the new Queen would usher in another Golden Age, in the optimistic context of lasting peace in Europe. Hewison has traced the movement back to ‘the cultural nationalism of the Second World War, when Britain faced the threat of sea-borne invasion, just as it had from the Spanish Armada [under Elizabeth I]’[154], characterising New Elizabethanism as merely a new version of a pre-existing national myth. However, this writer places little importance on the main aspect of New Elizabethanism, which was the association of modern science and technology with the enduring British symbol of the monarch. Further examples of this connection included the Queen’s official opening of Calder Hall nuclear power plant in 1956, during which she acknowledged the onset of ‘a new age’, and the development of ‘the motor car, the wireless set, the aeroplane’, before pressing a ceremonial button, seemingly turning

[151] *Ibid.*: 234

[152] Hewison, R (1997): 67

[153] Weight, R (2002): 226

[154] Hewison, R (1997): 66

on the tap to electricity from the atom[155]. The Duke of Edinburgh also adopted a role in this movement as a promoter of science and technology industries, becoming something of 'a Prince Albert for the jet age'[156]. He became President of the British Association for the Advancement of Science, and in March 1952 he visited De Havilland aircraft manufacturers and flew in a prototype Comet[157], the world's first passenger jet aeroplane and a symbol of Britain's technological revolution.

Although New Elizabethanism is widely regarded as having died off during the 1960s[158] it must be remembered that this movement formed part of a wider and more lasting ideology, which reflected a genuine sense of excitement and progress in Britain. This type of cultural movement, as well as events such as the Coronation and the Festival, are important to consider here as significant points in the discussion about what modernity meant in Britain during the mid-twentieth century, and are connected to the critical 'declinist' discourses identified above. Whilst it is necessary to set this thesis within such wider cultural movements, doing this will hopefully add to the understanding of not only British outer space, but also broader popular cultures of science, technology and modernity in Britain.

Understanding British outer space

This literature review has examined the academic and historiographical contexts in which the thesis as a whole should be considered. The first section has revealed a limited but significant range of approaches to studies of outer space from a geographical perspective, and this thesis aims to incorporate both the geopolitical and cultural lines of enquiry, whilst examining Britain as a space where contested and sometimes unsuccessful ideas of space exploration

[155] BBC On This Day (2010) [online]

[156] Weight, R (2002): 236

[157] Duke of Edinburgh's Trip in Comet (1952): 6

[158] Weight, R (2002): 319

have been promoted in interesting and unusual ways. As well as looking at the geographies of outer space directly, this chapter has examined the related discourses of geopolitics and science in the mid-twentieth century. One theme from this area has been a re-consideration of the twentieth century as a time when the practise of exploration developed in new and different ways, and this thesis will contribute to this emergent area of interest. The thesis will also address the extent to which certain internationalist discourses, such as scientific internationalism and Britain's post-imperial role, can be considered through a cultural geography of British outer space. The latter section of this chapter has revealed a dichotomy between official and social studies of scientific practise, which this thesis aims to converge by examining the ways in which institutional discourses have interacted with popular or social cultures of British outer space, whilst also contributing to debates about the nature of modernity in post-war Britain. The remaining chapters of this thesis will address these questions with an empirical focus on the British Interplanetary Society, a group that has attracted only limited attention, but remains a valuable source of insight into cultures of British outer space and its related discourses.

Chapter 3

Researching a Cultural Geography of British Outer Space

It has been apparent since the outset of this project that the research involved would not be centred around one particular set of sources, or confined to any singular archive. Researching an organisation and its wider cultural impact, which has been the goal of the thesis, cannot be achieved in such a way. With this in mind, four bodies of material were identified from the outset of the project as key areas of research. These consisted of, 1) *Eagle* magazine and the *Dan Dare* comics, 2) the institutional records of the British Interplanetary Society, 3) the selected novels of Arthur C Clarke, and, 4) Patrick Moore and *The Sky at Night* television programme. These would each require different analytical methods, including (inter-)textual analysis, archival work and interviews, whilst the groups of material all had definite links to the BIS, one way or another. The objective, therefore, was to adopt the BIS as the central empirical 'trunk' of the research, with 'branches' coming off representing the other key empirical sources. This approach also allowed me to investigate a wide range of supporting material, including a series of popular science journals in which BIS members published articles, namely, *Chambers's Journal*, *Practical Mechanics*, *Armchair Science*, *Tomorrow* and *Wireless World*, all of which were available at either the British Library in London or Radcliffe Science Library in Oxford. Published works by BIS members were also consulted with this approach in mind, including a selection of Patrick Moore's 'boys' novels' and BIS founder Philip Cleator's influential pre-war book *Rockets Through Space* (1936). In this way an intertextual mosaic would be compiled, providing insights into not only the cultures of British outer space, but also attending to the multitude of different media through which the principal ideas were disseminated and promoted.

In recent years, scholars have developed an understanding of the 'hidden histories' of subjects including the practise of exploration[159] and the discipline of geography, by engaging with unorthodox resources and an 'alternative focus on process rather than product [which] challenges our understanding of the archive as a static store of documentation'[160]. With this in mind, the combined range of source materials that I have selected can be read as an archive in itself, and as such, it is helpful to bear in mind Carolyn Steedman's self-reflective approach to the ways in which researchers conduct themselves in the archive. Steedman makes note of Derrida's arguments about the 'Western obsession with finding beginnings, starting places and origins'[161], and demonstrates an awareness that 'no one historian's archive is ever like another's'[162]. Indeed, the remnants of such an archive can be affected by choices taken by the researcher as well as other decisions about 'the (un)availability of sources, the negotiation of absent, powerful or powerless voices in the archive, or the immaterial qualities of certain kinds of historical source'[163]. Such concerns can be applied to the wider 'archive' from which this thesis has drawn, whether this constituted artefacts in the BIS archive, the personal memories of an interviewee or the pages of published material.

The *Dan Dare* comics that were published in the *Eagle* children's magazine from 1950 drew initial attention because of their position as a well-known 'cultural institution', and early enquiries revealed some intriguing connections to the BIS through the involvement of Arthur C Clarke. These comics have since been regarded with a certain amount of nostalgia about a particular era in British post-war history. This feeling was experienced at first hand, as, while

[159] Jones, L and Driver, F (2009)

[160] Lorimer, H and Spedding, N (2002): 298

[161] Steedman, C (2001): 5

[162] *Ibid.*: 9

[163] Gagen, E *et al.* (2007): 4

researching the comics in the British Library newspapers collection in Colindale, North London, other researchers tended to peer over my shoulder at the bright images and comment on their own childhood memories of the comics. Contemporary reverence for this children's magazine can also be seen in museums, with exhibitions at London's Science Museum[164] and at the New Walk Gallery in Leicester[165] containing *Dan Dare* memorabilia. These included toys, original drawings and graphic montages, some of which were sourced through fans' personal collections.

Figure 1 - *Dan Dare* memorabilia at the Science Museum

Author's photo

This kind of feeling towards an important source material should be kept in mind when considering the analytical techniques involved in the thesis, and the reactions that the research could produce in others who may have been familiar with the material from the latent perspective of childhood. In any case the use of comics as a source material would provide an interesting route into researching the theme of British outer space, drawing on ideas of identity formation, landscape analysis and a further sense of how the sequential

[164] Dan Dare and the Birth of Hi-Tech Britain (2008 - 2011)

[165] Space Age - Exploration, Design and Popular Culture (2010)

aspect of comics involve interactions with the reader in ways that are different from individual landscape depictions[166].

The second body of material that was to be approached consisted of the institutional records of the British Interplanetary Society. In contrast to the widely-known *Dan Dare*, the BIS is a little-recognised institution, and its existence was first made apparent whilst writing a research proposal and performing an internet search on key terms related to Britain and outer space. Further enquiries revealed that the Society was approaching its 75th anniversary, and the existence of a library, raising hopes of additional archival material. Throughout the course of the project, it has been possible to gain an understanding of some of the ways in which the BIS is viewed by certain groups of people, and these opinions had the potential to affect the ways in which I chose to engage with the organisation. One member of staff at the Royal Astronomical Society, during a telephone conversation made when attempting to gain access to their library, expressed surprise that a researcher would want to look into the history of the BIS, characterising it as outside of the 'serious' arenas of learned science, whilst offering suggestions for objects of study which may have been more worthwhile. This 'crackpot criticism' is not a new phenomenon, and evidently still survives, despite the Society's status as the world's longest-running organisation devoted to the idea of space flight. Although the BIS is now housed within substantial premises in Vauxhall, South London, with its large blue-and-white lettering visible from commuter trains approaching London Waterloo, it is often with surprise and confusion that members of the general public react to the Society's existence. This feeling is reflected in the recent appearance of the BIS in the London-centred arts magazine *Smoke*, whose writers knowingly search for eccentricities in the contemporary urban landscape.

[166] Cf. Dunnett, O (2009)

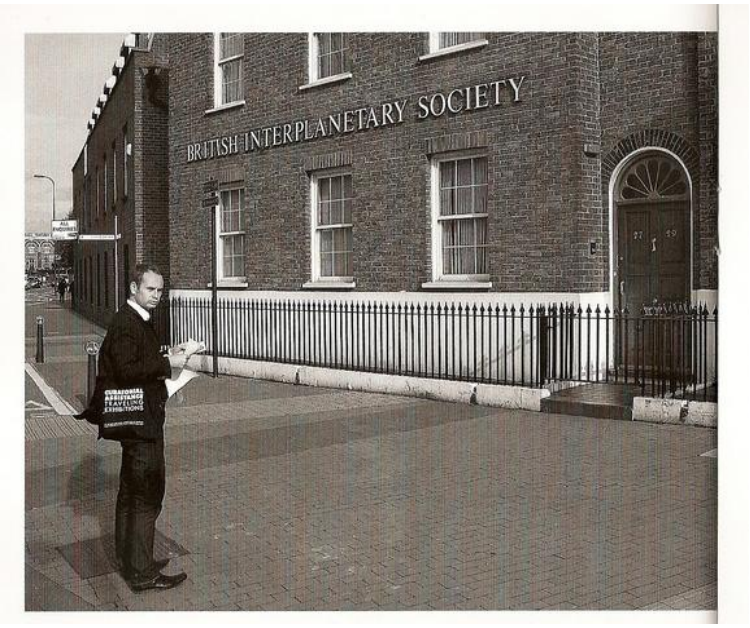

Figure 2 - The BIS in *Smoke* magazine

Source: Haynes, M (2008)

Here, the subject of the photograph looks puzzled as he stands in front of the BIS headquarters, apparently clutching a map or set of directions. The lack of information and slightly imposing front door add to the other-worldly sense of intrigue that emanates from the BIS premises. It is perhaps significant that most people would not feel the need to approach the BIS through anything other than casual inquisitiveness, however from the perspective of a researcher the Society proved to be easily accessible and welcoming. The initial bargain of access involved me becoming a member of the BIS, which would enable admission to the library, the initial port of call for researching the organisation's history. Once membership was attained, the first visit to the BIS required the display of the membership card (75th anniversary edition), and a simple request to use the library. With this approach came the question of what it means to join an organisation and research it from within. One way of addressing this issue is to frame my research as useful publicity for the Society, as it introduces the BIS to academics and other members of the public who would otherwise be completely unaware of it. Indeed, trading on its own history is one way of promoting the Society to visitors and prospective new members, and this strategy has

recently been adopted in the BIS library, which now prominently displays information about some of its key historical members.

The library itself is a substantial repository of factual and imaginative books, bound journals and institutional reports on the subject of interplanetary science. The most interesting aspect to someone interested in the BIS itself were the bound volumes of the Society's own publications, the *Journal of the BIS*, and *Spaceflight*, dating back in a continuous record to 1934 and 1956, respectively, and these were the main focus of my time in the BIS library. *JBIS* was to become the main source of information about the early years of the Society, and its nature as a published, duplicated document meant that it would be more easily accessible than other, unpublished materials. *JBIS* contains not only articles by members and others on the broad topic of interplanetary science, but also valuable information about the formation of the BIS and its operational structure, including annual reports and accounts from 1947 onwards. Whilst available elsewhere, in places such as Oxford University's Radcliffe Science Library and the British Library, the off-the-shelf access made the BIS library the most useful base from which to consult these sources. The BIS library is one of the largest libraries in the UK devoted to outer space, and as such contained some items that were simply not accessible elsewhere. This included an institutional history of the British Astronomical Association[167], which was only available under less convenient terms in the library of the Royal Astronomical Society. In addition to written material the library contains collections of space ephemera and models of space ships. Glass-plated cabinets displayed items such as badges from American space missions, and even a chunk of petrified sand from a nuclear test site in Arizona. Models adorned the tops of the bookshelves, and added to an atmosphere of quiet awe about the glory days of space exploration. This was in contrast to

[167] McKinn, R (1990)

the slightly dishevelled feel of the library, and an acute awareness that I was, for the vast majority of my time researching there, the only person in the room.

Figure 3 - The BIS Library. This corner represents about one third of the size of the library as a whole.

Author's photo

A recent article in *Spaceflight* has drawn attention to the BIS library, describing it as 'a forgotten treasure trove', and 'an oasis of calm and quiet'. The writer goes on to describe how the library is 'a physical manifestation of [the Society's] history and heritage', and how 'there are times when I'm alone in the library when I can almost feel the ghosts of Yuri Gagarin, John Glenn and Arthur Clarke emanating from the books on the shelves'[168]. In the same article, Sir Patrick Moore is quoted as saying that the BIS library 'has an atmosphere all of its own', and that, 'in the early days ... it contained books that were not widely known to superficial scientists, many of whom believed the whole idea of space travel was impossible'[169]. This atmosphere of the library is worth considering in relation to how it may have affected the direction of research during my own visits to the library. Furthermore, the imaginative geographies of the collection itself, which has accrued since the 1950s, are

[168] Stewart, M (2010): 397 - 398

[169] Quoted in Stewart, M (2010): 398

interesting to bear in mind[170]. Whilst the journals related to the BIS are attributed a relatively prominent place in the library, they only account for a small proportion of the collection itself, which is arranged by subject, and includes such varied topics as the reports of the European Space Agency, the search for extra-terrestrial intelligence, and the planets of the solar system.

A total of eight trips to the BIS were carried out during the course of study, some of which consisted of visits over several consecutive days. Following the first few visits, members of staff became more familiar to me, and I to them. An appropriate time came to enquire about the BIS archives, which were known to exist on the top floor of the building, above the library. Access to this section of the Society's records proved slightly more challenging. At first, I was required to request certain items from the archive, which would be brought down for viewing in library. This method proved useful up to a certain extent, as minute-books from some of the Society's AGMs were consulted, along with a box file of items relating to the 1951 International Astronautical Congress. However, this system ultimately would have restricted the scope of the research, as the selection of material was being made by a third party, and it was difficult to know what to request without having seen the archive's contents. However, instead of asking for further access immediately, it seemed appropriate to make use of the resources that were made available and wait until the next few visits. Perhaps what contributed to this approach was a feeling that I was a guest at the Society, and guests are not meant to out-stay their welcome.

In the meantime, the library at the BIS also served as a meeting place. By this time the significance of the Society's 75th anniversary had come into focus, with the publication of *Interplanetary - A History of the British Interplanetary Society* in 2008, with its accompanying

[170] Cf. Craggs, R (2008)

Audio History of the BIS on CD. The book's editor, Bob Parkinson, was at the time the 'President-elect' of the BIS, and I approached him by email seeking to set up an informal interview about the Society's history. This took place in the BIS library on the 15th July 2009, and proved to be a productive encounter. As well as pointing me in the direction of several articles by BIS members on the history of the Society, Dr. Parkinson subsequently sent me his research notes for the *History of the BIS* book, in the form of a MS Access database, and, most usefully, a photocopy of a 124-page typed memoir by founder BIS member L J Johnson. This document, undated, is an invaluable account of the formative years of the BIS in Liverpool, which was to be essential in terms of triangulating the other principal narrative of the formation of the BIS, which came from its founder, Philip Cleator. This is important not just to verify Cleator's official account, as told contemporaneously in *JBIS* and retrospectively from a range of outlets, but also to add another personal viewpoint to the series of events that precipitated the Society's formation. Pre-war records such as these have proven to be much more difficult to obtain than post-war accounts, primarily because of wartime bombing, which destroyed many BIS records. The discussion with Dr. Parkinson lasted around forty-five minutes, and covered subjects including his involvement with the BIS from the 1970s onwards, the meeting places of the BIS before it acquired its own premises, and several pointers for new sources of information, such as the typed memoir. I also asked about what was in the archive, at which point I was led up to the top floor and into the relevant rooms for a quick look around. The archive itself is better described as a stock room, with unorganised and un-catalogued stacks of papers, promotional material and boxes on shelves, both marked and unmarked.

Figure 4 - The BIS archive

Author's photo

Whilst I was not able to spend as much time in the archive as I would have liked initially, one or two items were pulled out from the shelves by Dr. Parkinson, and were noted for later inspection. This was evidently not the time to begin a systematic review of the archive's contents, and I left with a better sense of what the archive contained, as well as a list of items to follow up from the conversation in the library.

The next visit to the BIS some weeks later proved to be just as useful, as I was granted free access to the archive, and had seemingly earned enough trust to be allowed in there alone. There was even a small workspace, with a desk curiously adorned with green baize. At this point the inconveniences of an un-catalogued archive became all too apparent, with unorganised stacks of information, both historical and contemporary, about the Society's operations available for inspection. A quick survey revealed that the majority of the items on the shelves were excess stock that would otherwise have been kept in the library, including reports from international congresses and a great deal of miscellaneous paperwork from the 1970s onwards, which were not useful to me. A closer look revealed a collection of large boxes that had ostensibly been mailed to the BIS by members, including one containing a stack of early editions of the science fiction magazine *Scoops*. There were many interesting

items in this 'science fiction corner', including signed copies of novels by Arthur C Clarke and other BIS members. The most useful resource, however, was probably the book of press cuttings, a large volume containing pasted newspaper clippings about the BIS dating back to the 1930s. This included several items which I had been looking for in other locations, having followed references to specific articles that proved to be inaccurate in one way or another. The cuttings appeared to be originals that had been commissioned from a press cutting service. This portrays the BIS as an organisation that was interested in its own history, although it was unclear exactly when the cuttings were brought together. This became one of the main sources of information about the pre-war BIS, alongside the *BIS Journal*, retrospective accounts, and the Johnson memoir. Notes were made and photographs taken of these cuttings, for later inspection, unsure as I was of the frequency of access I would be able to achieve over the coming months. Information on specific members of the BIS could also be found in the archive, but to a limited extent. There was, at the time of one of my visits, a plan being initiated by certain members of the BIS to write the biography of one of the key post-war members, Val Cleaver[171]. In relation to this, two box files with information on Cleaver had been collected, which I could look at, albeit under instruction to put everything back in the right order. Some useful personal memoranda were available here, as well as some of Cleaver's correspondence as Chairman of the Society from the 1950s, and notes were taken on these interesting sources. Perhaps more surprising was the box file on the Society's founder, Philip Cleator.

[171] This project is still underway at the time of writing

Figure 5 - 'P E Cleator' box file in the BIS archive

Author's photo

Among the contents of this rather forlorn file was Cleator's fascinating account of his correspondence with Henry Mencken[172] that started in the 1930s and continued into the late-1940s. Although the only letters reprinted verbatim are those from Mencken to Cleator, they are placed in context by the latter's comments. It seemed strange that this volume was not housed in the BIS library, as it does contain accounts of the setting up of the BIS and Mencken's response to this. It is perhaps all the more surprising that current BIS members were seeking to compile a biography of Val Cleaver, where no such biography exists of the Society's founder. The solitary box file also contains a poignant series of letters from Cleator to the long-serving BIS secretary Len Carter, written in the 1980s. One of them reads as follows:

> 'With the sound of angels noisily flapping their wings overhead serving as a reminder that my appointment with Henry Mencken in the sub-terrestrial Hell of the Christians daily grows nearer, I have been making an inventory of effects of

[172] Cleator, P E (1982) (ed)

> astronautical and astronomical import in my possession, some of which may be considered of sufficient interest for inclusion in the BIS archives'[173]

The suggestion was made that the BIS send someone with a car to pick up the relevant material, but it is unclear as to whether such effects were ever transported to the BIS in London from Cleator's residence in Merseyside, and no such items appeared in any obvious way in the BIS archive room. Such discoveries serve as a reminder that archives of private institutions are 'sites of and for authority'[174], and as such are deeply dependent on what that particular organisation wants to obtain, store and allow access to. My research in the BIS library and archive was certainly influenced by such decisions, although the use of sources outside of the BIS was one attempt to circumnavigate these difficulties. Whilst Cleator's letters brought across his dry sense of humour and unassuming manner, a typed memo by Len Carter gave a further account of Cleator and his personality:

> 'Not only was he erudite but one who could be classed as an "original" thinker, well able to make his points in a most devastating manner. He did not suffer fools gladly and was never loath to communicate his views in the most biting manner.'[175]

Insights such as this are stumbled across unintentionally in such an archive, and help build up a useful picture of one of the main protagonists of the thesis. In this way a tension is built up between a person's characteristics and the artefacts that they produced. Sometimes the characteristics of people from the past are clearly reflected in their work, and at times it is hidden behind their style of writing, but with Cleator there was a sense that his personality often came through, which was unusual and affected a greater sense of personal involvement with the records that I had been studying.

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[173] Correspondence: Philip Cleator to Len Carter, 1/5/1986

[174] Johnston, R and Withers, C (2008): 5

[175] Personal memoranda: Len Carter (undated)

Along with the BIS and *Dan Dare*, the third empirical focus of the research was to be a selection of the novels of Arthur C Clarke. Clarke has a curious image in the public eye, as someone who spent most of his life in a private compound in Sri Lanka, and is principally known for writing the screenplay for the classic science fiction film *2001: A Space Odyssey* (1968), and for presenting various television programmes in the 1980s. Clarke is also known for a newspaper controversy in the late-1990s, whereby the *Sunday Mirror* accused him of having inappropriate relationships with children. These accusations were unfounded, and the newspaper was forced to issue an apology. Clarke's death in 2008 also prompted a surge of interest in his life and works, and several obituaries and articles on Clarke were published. Due to his ex-pat lifestyle and curious Somerset / Atlantic accent, it is often not known that Clarke was British, and it is even less widely known that he was a prominent member of the BIS in the early post-war years. The interaction between a writer's fictional works and their activities within a scientific society became an interesting idea to pursue, and initially I examined some of Clarke's early novels for representations of the BIS. It was then decided to limit the focus on Clarke's novels to those which had the clearest connections to the Society, which, naturally, were those that were written around the time of Clarke's heaviest involvement with the BIS, the period between 1945 and 1956. Specifically, these were *The Sands of Mars* (1951) *Islands in the Sky* (1954), *Earthlight* (1955) and *Prelude to Space* (1953). The former three were later incorporated into a 'Space Trilogy', and share thematic elements related to the exploration and colonisation of the planets of the Solar System, whereas the latter is entirely set on Earth, and deals with a fictional organisation that is purportedly based on the BIS. These works also form the basis of Clarke's early *oeuvre,* which is characterised by what is referred to as 'hard sf', as opposed to the more expansive, quasi-religious themes which are introduced in his later novels.

It soon became apparent that isolating fictional works such as these as discreet source materials was not the best approach. With so many cross-references made to other types of published writing, including works directly connected to the BIS, an intertextual approach was deemed necessary. With this in mind, sources such as the technical magazine *Wireless World*, as well as *JBIS* and *Spaceflight* were consulted as intertextual documents that supported my selective analysis of Clarke's novels. There were instances where this set of fictional and non-fiction discourses became a source of inspiration for other writers, whose works became important sources in their own right. This included C S Lewis' *Space Trilogy*, written in the 1930s and 1940s partly as a response to activities within the BIS and connected published works. It was important to analyse the works of a critic of the interplanetary movement, and Lewis' works offer balance to my account in this respect. The literary debate between Clarke and Lewis also spilled over into personal and written encounters between the two authors, which have been documented in a number of secondary accounts. Other published works also came into the fold of this literary discourse of British outer space that was beginning to emerge. This included certain works of Olaf Stapledon, a British science fiction writer who was a member of the BIS, but was not active in its institutional development. Stapledon gave a lecture to the BIS in 1948, and his related notes and correspondence are now available for viewing at Liverpool University's own 'Stapledon Collection'. Its contents were bequeathed to the University upon Stapledon's death, and forms part of a substantial science fiction collection. This archive operates in a completely different way to the BIS archive, whereby items were searchable on an online catalogue, and were requested in advance. My approach to this material was also different, as I came to search for items related to a specific event, as opposed to being interested in the archive on a more extensive scale.

My approach to fictional published works, as well as being intertextual, pays attention to the texts' underlying discourses. As such, I have extensively consulted biographies and autobiographies of the key authors, where such accounts have been available. This has included Clarke's 'science fictional autobiography' dealing with his early influences in the science fiction community, and his official biography, which takes in a more comprehensive view. In addition, C S Lewis has had a number of biographical accounts written of him, some of which have been thematic, others incorporating his collected correspondence. Biographies are useful because they contain information about their protagonists that would be otherwise unavailable, or difficult to come by. This was certainly the case with *Eagle* editor Marcus Morris, whose biography was written by members of his family, and as such provided unparalleled access to information about Morris' life and works. Information about Frank Hampson, the creator of *Dan Dare*, was also attained through his biography, which was naturally centred around the work for which he became best known, and both accounts helped contextualise the comics with the circumstances and events that surrounded their creation. As well as published biographies, shorter accounts from the Oxford Dictionary of National Biography were invaluable in providing basic information about some of the lesser known characters in the thesis, including the second BIS President A M Low. Low also had a full-length biography written upon his death in 1956, which was an essential source of information about this fascinating personality, and presents views of Low from certain interesting perspectives.

The fourth body of empirical material identified from the outset was to be records related to the BBC television programme *The Sky at Night*, which has been on our screens in the UK since 1957. It was also known that the programme's presenter, Patrick Moore, was an active BIS member around this time, and he was the inaugural editor of the BIS magazine *Spaceflight*. Therefore, an obvious connection between *The Sky at Night* and the BIS could be

exploited, with the added advantage of having a different type of source material to examine, a television broadcast. Extensive video recordings of the early broadcasts were unavailable, although some clips were accessible at the British Film Institute, where they were viewed on site. However, equally valuable were the microfilm copies of the programme's production notes, which were available at the BBC's Written Archive Centre in Reading alongside a substantial file of correspondence between Moore and the BBC producers. The production notes, which were in quite poor condition and only just legible, consisted mostly of scripts, which were written alongside 'stage directions' for what was happening in front of the camera, as well as information about lighting, props and other televisual prompts. As such, these records served as an example of what Gagen *et al*. have referred to as ways of engaging with 'existing "representational" sources as conveyors of historical "performance"'[176]. These sources built up an understanding of *The Sky at Night*, including its pre-production and the ways in which the programme sought to reach out to viewers. The BBC archive had much in common with the Liverpool University archive in terms of having to request material in advance after searching online. However, the archives were held in their own building, with quite strict access procedures, and at times a waiting list of up to two months was necessary before an appointment could be made, due to the popularity of the archive.

Examining the *Sky at Night* records as well as Moore's contributions to *Spaceflight* were two interlinked approaches that sought to examine issues of public engagement with the idea of British outer space. Moore was becoming a key character in the thesis, and conducting an interview with him was a possible course of action. Moore was one of the few protagonists in the thesis who was still alive and well, and he continues to present *The Sky at Night* from his home in Selsey, West Sussex. He was also still a member of the BIS, and had appeared in

[176] Gagen, E *et al.* (2007): 5

Spaceflight a number of times since I started my research. This seemed like the best way of approaching Sir Patrick, so I sent him a letter requesting an interview care of the BIS, having consulted the BIS secretary for approval. There soon followed a series of exchanges with Sir Patrick, in which he phoned the School of Geography main office at Nottingham (the number given on the letter-head), and also sent me a letter confirming that he would be happy to do an interview. A subsequent phone call from me confirmed the time and date, which was to be Monday the 2nd November 2009 at 2pm, and all that was left to do was travel to Selsey to conduct the interview. In the meantime, a series of questions was compiled, aiming principally to find out more about Moore's involvement with the BIS, which is one part of his career that is relatively undocumented. I would also ask about *The Sky at Night*, although such accounts already existed in Moore's autobiography, and from the BBC archive.

Finding the way to Sir Patrick's house in Selsey was relatively straightforward, and, upon knocking on the front door, which was open, a personal assistant invited me in. As I arrived another couple were leaving, having had some books signed, and it seemed as though visitors were generally quite welcome. Seated in his open study on the ground floor, Sir Patrick was surrounded by books, globes, photographs, telescopes and other astronomical ephemera. His manner was friendly and hospitable, and we began the interview, which was recorded on audio tape, after a few words of greeting. Whilst the physical surroundings of the interview were enabling rather than imposing, perhaps the greatest influence on the course of the encounter was the manner of Sir Patrick himself, and his mode of address. Whilst he did answer each question I asked, Sir Patrick had a tendency to respond to the question quickly, sometimes with no more than a word, before moving into detailed accounts of something quite different, perhaps with certain assumptions in mind about what I wanted to know. This, combined with his extremely fast and variable diction, often threw the interview off course, and I had to chop and change my line of questioning from what I

had in front of me, to instant reactions to one of Sir Patrick's tangents, although this pattern is not uncommon in interviews. The interview lasted around half an hour, and a good amount of useful information and viewpoints were recorded on topics including his editorship of *Spaceflight*, his friendship with Arthur C Clarke, and his experience presenting early episodes of *The Sky at Night*. These ultimately tended to triangulate other accounts, rather than offer completely new ideas or information, but the interview was also valuable in that respect, in that it tended to confirm and consolidate already existing lines of enquiry.

Through adopting an inter-textual, multi-sourced approach, it has been possible to research the BIS and cultures of outer space on an extensive basis, uncovering connections that had been unexpected, and would have remained dormant had I just focused on the material produced by the BIS from an institutional perspective. In this way it has been possible to find out about how an organisation such as the BIS engages with other people and places, influencing cultures of outer space on a scale that was not anticipated at the time that the research idea was initially conceived. In the empirical chapters that follow, instead of centring each one around one of my four groups of source materials, I have adopted a thematic approach that is also loosely chronological, and the sources overlap between different chapters, although some are confined to particular sections.

Chapter 4

Emergent Discourses of British Outer Space

The purpose of this chapter is to examine how a discourse of British outer space emerged and sustained itself in the mid-twentieth century, with an empirical focus on the British Interplanetary Society. It must be remembered that, although this thesis as a whole is not just an examination of the BIS, this organisation serves a purpose as a central empirical thread throughout the thesis, and it therefore deserves significant attention here, providing a basis on which to explore other connected source materials in the following chapters. As such, I shall trace the narrative of how the BIS emerged from a small group of enthusiasts in Liverpool in the 1930s, following its post-war consolidation as it became arguably the most influential and popular of all the twentieth century space flight societies, operating on a broad scale across Britain and Europe. This story will focus on some of the key members of the BIS, as well as its broader membership base, whilst also taking into account the financial basis by which the Society was able to sustain itself over the years. The Society's claims to knowledge are also important here, as the attempt to delineate a field of knowledge is brought into focus. This will include examinations of intellectual artefacts such as the *BIS Journal*, which had a crucial significance in the pre-war period, as well as other items such as prototype models, photographs and books. I shall also be examining the institutional vernacular geographies of the BIS, including the offices, coffee shops and public houses in which members met and ran their Society, bearing in mind Livingstone's assertion that the location of scientific practise can inform us about the conduct and content of science[177].

[177] Livingstone, D (2003)

Philip Cleator and the founding of the British Interplanetary Society

Philip Cleator had a life-long interest in the concept of space flight, which was sparked when he saw a film in the mid-1920s about the then 'wonder metal' radium and its proposed use as a nuclear fuel, the last scene of which portrayed a 'rocket-like vehicle' blazing into the upper atmosphere[178]. The details of this film remain unknown, but one commentator has suggested that it may have been *All Aboard for the Moon*, produced in New York in 1924[179]. Cleator's interest was further fuelled when he heard about new groups of rocket experimenters in Germany and the USA, and having initiated correspondence with these organisations, started to come up with the idea of establishing a similar group in Britain. Cleator's initial creative endeavours on the subject of space flight took the form of an article in the January 1933 edition of the popular science publication *Chambers's Journal* (see Chapter 6), in which he had previously written on items ranging in subject matter 'from bacteria and anaesthesia to combustion and the atmosphere'[180]. The article outlined what Cleator knew of rocket research being undertaken in the overseas societies, and explained the application of this work to space flight, ending with the conviction that:

> 'whether we like or dislike the idea, believe or disbelieve, interplanetary travel will come.'[181]

Here it is appropriate to identify the important distinction between rocketry and its interplanetary application. The rocket itself has a long and complicated history, from the

[178] Cleator, P E (1982): 28

[179] Winter, F (1983): 87

[180] Cleator, P E (1982): 27

[181] Cleator, P E (1933): 54

Chinese 'fire-arrows' of the middle-ages[182], through its adoption as a ballistic missile against the British East India Company in the Anglo-Mysore Wars of the late-eighteenth century[183], and its subsequent deployment in the Napoleonic Wars by Sir William Congreve[184], to name just a few key examples. In the twentieth century this branch of rocket development as small- to medium-sized weapons of war continued with the 'Unrotated Projector' rockets in Britain in the late-1930s, which were used with limited success as a naval anti-aircraft weapon[185], and the shoulder-mounted bazooka in America from 1942, a form of weaponry which soon spread to Germany as the *Panzerschreck*. However, the concept of using rockets as the basis for space flight was conceived independently in the early-twentieth century by the rocketry pioneers Robert Goddard in America, Robert Esnault-Pelterie in France, and Konstantin Tsiolkowsky in Russia, based on the assumption that rockets would work as a form of propulsion in the vacuum of space. The idea was then adopted by space flight societies in Germany, the USSR and America in the 1920s, which is when Cleator became aware of the concept which was to capture his imagination for years to come.

Having published his article in *Chambers's Journal,* Cleator's desire to form a society dedicated to space flight was still pressing, and on the 8th September 1933 he placed an announcement in his local newspaper the *Liverpool Echo*[186]. This mysteriously entitled short message encouraged those interested to contact Cleator at his home address. Having received several replies, Cleator arranged an informal meeting at his house in Wallasey, just across the River Mersey from Liverpool on the Wirral Peninsula, later that month. Here, the

[182] Cleator, P E (1936): 36

[183] Cooper, R G S (2003): 27

[184] Stearn, R T (2004) [online]

[185] Postan, M *et al.* (1964): 287

[186] British 'Rocketeers' - Reaching the Moon - And Elsewhere (1933)

five attendees, who can be named as Cleator, Leslie J Johnson, Colin Askham, Herbert C Binns and Norman Weedall[187], 'solemnly pledged [them]selves to begin the monumental task of making the inhabitants of Great Britain rocket-conscious and astronautically minded'[188]. Leslie Johnson recounted his impression of the first meeting of the fledgling BIS:

> 'There was no doubt amongst [the prospective members] that they were prepared to form a "British Interplanetary Society". Indeed, there seemed to have been little discussion concerning the name that the new society should bear, and which seemed to those present to have become self-evident'[189]

Although the name of the BIS is described by Johnson as being 'self-evident', it was almost certainly proposed by Cleator, who was encouraged by the development of not only the Berlin-based *Verein für Raumschiffahrt*[190], founded in 1927, but also the American Interplanetary Society, which was founded in 1930. Despite the likely inspiration from its American precedent, the choice of the word 'interplanetary' is an interesting one, when bearing in mind the other possible terms that could have been used to describe the Society, such as 'outer space', 'space flight' or even 'interstellar'. 'Interplanetary' emphasises the condition, not necessarily the means, of being in outer space, and also implies its own limitations of scale; that is, the space between the planets of the Solar System, including the Moon, but possibly not including the space beyond our home star system. 'Interplanetary' also places the different planets on a level playing field, assigning the Earth equal status to the other planets of the Solar System, and this arrangement has implications for the implied networks between planets, which would not necessarily place the Earth as its centre of

[187] Johnson, L J [Unpublished copy of typed memoir]: 5

[188] Cleator, P E (1982): 29

[189] Johnson, L J [Unpublished copy of typed memoir]: 5

[190] The *VfR* translates as 'Society for Space Flight'

calculation. Whilst this term defined the imaginative scope of the Society, the prefix 'British' was included to establish it as a national organisation, 'not a local "rocket club"'[191], but an organisation with higher aims, that wanted to reach out to as many people in the country as possible.

The name of the BIS was to become a subject of debate within the Society itself, and the implicit tension between the words 'British' and 'Interplanetary' is indeed crucial to the understanding of the Society, as it sought to bridge the anticipated gulf in scale between a nation state and the vast, three-dimensional expanse of outer space. These conceptual leaps would have been at the forefront of the imaginations of the founding BIS members, albeit grounded by the more immediate problems concerning the development of rockets. In this way a combination of expansive idealism and practical engineering provided both an ultimate aim for the BIS, as well as a more tangible task to get to grips with. Turning back to the preliminary meeting at Cleator's house, Leslie Johnson provides some further details:

> 'In spite of all the extra publicity, only about half-a-dozen enthusiasts turned up that evening, when they were entertained at Philip Cleator's laboratory, shown an embryo rocket motor, and had demonstrated to them the unstable explosive qualities of Fulminate of Mercury. The prospective members enjoyed a pleasant evening at the laboratory'[192]

That Cleator had a laboratory at his premises demonstrates the keen interest that he obviously took in science, and although this home location indicated somewhat of an amateur sensibility, 34 Oarside Drive was also the headquarters of the engineering business that Cleator inherited from his parents, which had the impressive-sounding title 'the Science

[191] Johnson, L J [Unpublished copy of typed memoir]: 6

[192] Ibid.: 5

Research Syndicate'[193]. In this first gathering of prospective BIS members, Cleator's laboratory was used as a space of demonstration, display and entertainment. This was not to the detriment of the quality of scientific practise, as the enrolment of the rocket motor as a key artefact of interplanetary exploration at such an early stage demonstrates. Indeed, the home laboratory and demonstrations seem to have won over Cleator's guests that evening, who went on to become the core members of the BIS. Whilst references to Cleator's laboratory are scarce[194], we are able to return to this location by examining a press photograph that appeared some years after this initial gathering.

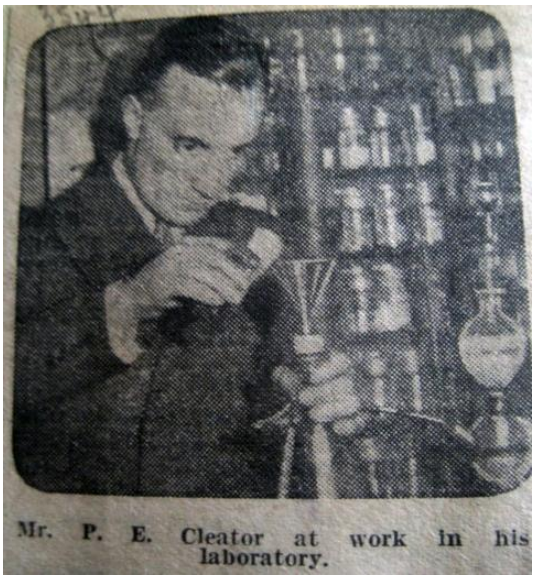
Mr. P. E. Cleator at work in his laboratory.

Figure 6 - Press photograph of Philip Cleator in his laboratory.

Source: BIS press cuttings book, *BIS Archive* (originally appeared in the *Daily Sketch*, 21/2/1936)

In what is likely to be a staged scenario, Cleator is pictured 'at work' with his apparatus, in front of a cabinet displaying various chemicals in containers. The accompanying article notified readers of Cleator's book *Rockets Through Space* (1936), which had attracted significant interest in the press, and the author's scientific pose may have been an attempt to convey the book's authority or credibility. In any case, the representation of Cleator's laboratory as not just a place of experiment, but also a space of entertainment and publicity,

[193] Winter, F (1983): 87

[194] The laboratory, as part of Cleator's home, was destroyed by a bomb in 1941.

demonstrates one of the ways in which the nascent BIS used certain locations in unconventional ways in this early period.

The initial meeting at Cleator's house was one of three preliminary gatherings in the autumn of 1933 that were organised prior to the official inaugural meeting of the BIS. The other two were held at the house of Colin Askham[195] at Devonfield Rd, in a suburb of Liverpool, attended by Askham, Johnson and Cleator; and at a hotel near Seacombe Ferry in Wallasey. The latter meeting was attended only by Askham and Cleator, Johnson noting that although he 'presented himself at the place of rendezvous, he was unable to find both Cleator and Askham at the very busy public house on the sea-front'[196]. Nevertheless, it was decided at that point that the inaugural meeting of the BIS would take place at 7pm on Friday October 13th 1933 at the office of Herbert C Binns on the second floor of 81 Dale St, Liverpool, a central location said to be 'typical of a solicitor's or accountant's office ... with dark woodwork and translucent glass panels'[197]. Binns was one of Cleator's guests at the first preliminary gathering, and perhaps the more professional setting of this inaugural meeting reflects the seriousness with which Cleator and this small group of enthusiasts took their task of creating a British Interplanetary Society. At this gathering, the three main protagonists were assigned the roles of President (Cleator), Vice-President (Askham) and Secretary (Johnson), in what was expected to become a national organisation with ambitious and wide-reaching goals.

[195] Colin Askham was partly responsible for setting up the Littlewoods pools in the late-1920s, the name coming from his own family. However, he was bought out of the franchise by business partner John Moores for £200 (Moores went on to become a millionaire by 1932).

[196] Johnson, L J [Unpublished copy of typed memoir]: 6

[197] *Ibid.*: 6

The expansion of the BIS, 1934 - 1936

By examining these first few gatherings we can see how the BIS started to come together, as part of a process that sought to establish a discourse of British outer space. Unlike other established disciplines of knowledge, which were generally cultivated either in learned societies or academic departments, interplanetary science could not rely on a pre-existing infrastructure of knowledge including libraries, lecture halls and meeting rooms. Whilst groups such as the Royal Astronomical Society (est. 1820) and the Royal Geographical Society (est. 1830) emerged from London dining clubs for the social metropolitan elite, and by the twentieth century were able to rely on a long history of financial bequests, academic departments from the late-nineteenth century were able to sustain themselves through a combination of regular student fees and government funding. These arrangements did not apply to the BIS, whose only source of pre-war income was from membership subscriptions and small donations[198], which 'barely covered running expenses'[199] in this early formative period. Whilst some of these deficiencies were accommodated by using public locations and members' homes as early meeting places, the BIS needed a more solid foundation on which to mark out its intellectual territory, and this need was met through the establishment of a regular publication - the *Journal of the British Interplanetary Society*.

JBIS first appeared in January 1934, and, allowing for a gap during the Second World War, remains the longest-running journal on the subject of 'astronautics' in the world. Cleator believed that the continued existence of the BIS depended to a large extent on the publication of a journal, which would act as the glue to bind the Society together:

[198] Information about the Society's pre-war finances are limited to anecdotal recollections and a limited amount of data published in the *Journal*.

[199] Ross, H E (1950): 97

> 'The tremendous importance of a substantial and interesting journal was brought home to me during my conversations with the German experimenters ... The Journal of a Society constitutes a vital connecting link [and] must come before experimental work'[200]

Cleator's passion for putting his idea into practise resulted in his paying for the printing of first few editions out of his own pocket[201]. In addition, Cleator's personal inscriptions can be seen all over the front cover (Figure 7), including his home address written above an elegant two-tone graphic design of a rocket ship moving over a cityscape, with the night sky in the background[202].

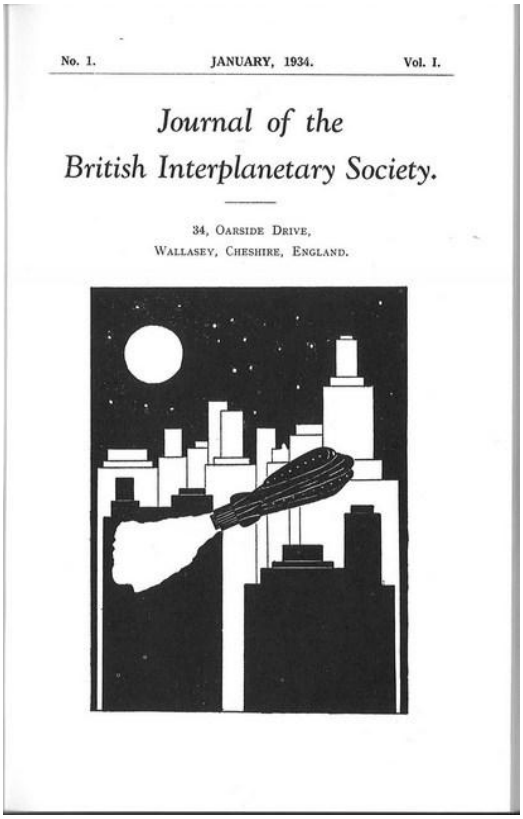

Figure 7 - *JBIS* **1**(1) [Jan 1934]

[200] Cleator, P E (1934a): 13

[201] Cleator, P E (1950): 49

[202] This was to be the front cover design for the first three issues of the *Journal*, after which other designs replaced it.

This image was one of several contributions from BIS members entered into a competition to design the front cover, with the promise of the monetary prize of one guinea for the winner. Cleator later admitted that he had, rather shamelessly, declared himself the winner of his own competition[203]. In any case, the image is reminiscent of Fritz Lang's *Metropolis* (1927), and its futurist aesthetic mirrors the idealistic nature of much of the early activities of the BIS, and is certainly eye-catching.

Whilst the first issue of *JBIS* ran to a modest six pages, the second came in at a more ambitious sixteen, and even though Cleator freely admitted that the 'present membership does not warrant such a large publication'[204], this expansion in volume was done 'by way of an experiment, conducted in the hope - and in the belief - that it will be of material aid in our constant efforts to increase membership'[205]. The publication of the *Journal* also allowed Cleator to declare the aims and objectives of the BIS, which included a significant public awareness remit:

> 'The ultimate aim of the Society, of course, is the conquest of space and thence interplanetary travel ... [The Society's] immediate task is the stimulation of public interest in the subject of interplanetary travel, and the dissemination of knowledge concerning the true nature of the difficulties which at present hinder its achievement.'[206]

At once we can see the dual qualities of the Society - the idealistic concept of interplanetary travel, pegged back at this stage by a realistic assessment of the magnitude of the task ahead. Whilst the existence of the *Journal* made possible the dissemination of such

[203] Cleator, P E (1950): 50

[204] Cleator, P E (1934a): 13

[205] *Ibid.*: 13

[206] Cleator, P E (1934c): 3 - 4

information from Cleator, who wrote most of the early articles, to members, it also began to serve as a forum for ideas, which very quickly focused in on the name of the Society itself. In this respect, one member expressed his concerns about the radical outlook that was implicit in the name of the BIS:

> 'In this country, more so than in others, the outlook is conservative ... As a deterrent to increased membership of the Society, the word 'rocket' is bad enough ... but 'interplanetary' is worse – it is still fantastic.'[207]

J E Strong suggests a name such as 'The Society of British Rocket Engineers', to keep in line with established organisations such as the Institute of Mechanical, Electrical and Chemical Engineers. It seems that this member had particular views on how British identity should affect the actions of a British society – a conservative approach concentrating on engineering, which was quite at odds with the mantra that Cleator, as the ideological driving force of the Society, was promoting at this time. Nonetheless, Cleator, as editor of the *Journal*, published Strong's letter on the first page, and put his own views across in an editorial on the next page, maintaining that 'the *raison d'être* of the Society – however remote it may seem at present – is to achieve the conquest of space, and thence interplanetary travel'[208]. Arthur C Clarke, who joined the Society in 1934 (aged seventeen), offered his opinion on the founding principles of the BIS and the role of rocketry:

> 'We British are a wildly imaginative race, and to our annoyance the conservative Americans did not consider that space travel was respectable. Though they had formed the American *Interplanetary* Society in 1930, the name had been changed

[207] Strong, J E (1934): 33

[208] Cleator, P E (1934b): 34

to American *Rocket* Society [in 1934]. The suggestion was made that we should follow suit, but we refused to lower our sights.'[209]

'To us, the rocket was merely the interplanetary bus; if a better one came along we would transfer, and give the rocket back to the fireworks industry.'[210]

In contrast to the opinion of Strong, Clarke shared the radical and ambitious views of Cleator, and here projects this conception of the BIS onto his perceived characteristics of the British people. Furthermore, the 'ideological gulf'[211] between conservative and radical approaches to space flight is used by Clarke to represent a more deep-seated set of differences between the American and the British way of doing things. When considering the activities of the pre-war BIS, it seems that the latter, more adventurous mode of thought prevailed in the Society, in contrast to a vocal minority who were interested in the mechanics of space flight, but thought that a more traditional approach was needed. This fundamental difference in approach has also been highlighted by pre-war BIS member Les Shepherd, who notes that 'at one stage, a quarter of our members were Americans who were disgruntled with the American Rocket Society'[212]. This more balanced assessment accounts for differences in opinion within the early American astronautics community, as well in the BIS.

The language used by BIS members to describe British national identity, ranging from the 'conservative' to the 'wildly imaginative' demonstrates Peter Mandler's contention that 'national character can be used to reflect its exponents' current beliefs, anxieties, self-understandings and prejudices, while seeming to stand for timelessness and genuine

[209] Clarke, A C (1989): 147 [italics in original]

[210] Clarke, A C (1966): 168

[211] *Ibid.*: 167

[212] From Imagination to Reality - An Audio History of the British Interplanetary Society (2008) [multimedia CD]

cohesion'[213]. However, as mentioned earlier, the official naming of the Society seemed to use the 'British' prefix on more of a descriptive basis in an attempt to establish the administrative scale of the Society, not with the intention of drawing on the qualities of 'Britishness' that this may have implied. This breadth of meaning also shows that the concept of a unified national character is misleading in this context, and instead we have different, even polarised interpretations of what it meant to form a *British* Interplanetary Society, which were called upon by certain members in order to amplify their personal opinions about how the Society should be presented. These discussions that took place in the mid-1930s demonstrate quite a detailed level of introspection within the Society, views that were generated and disseminated through the medium of the *Journal* as the BIS sought to forge an identity for itself and the emerging discourse of British outer space. It is fair to say that such a rigorous form of self-scrutiny would not have been possible in the Society without the existence of the *Journal*, which evidently succeeded in providing Cleator's 'vital connecting link' between the leadership of the BIS and its wider membership.

In addition to the outward projection of the Society's aims, and the dialogues that developed through the *Journal* between members, one of the principal elements of *JBIS,* and, indeed, any other journal, is the substance of the articles within it. This was particularly important for the emergent BIS, as it sought to delineate the topics that would be included in its general remit. The defining question was the extent to which the BIS would be a technical organisation interested in rocket engineering, as opposed to a group of idealists interested in the philosophical implications of space exploration. To strike a balance between these views, the technical articles tended to be written in a basic, easy-to-understand manner, whilst the more speculative contributions would always retain realistic elements, without wandering too far into the realms of fantasy. As an example, Cleator's contribution on 'extra-terrestrial

[213] Mandler (2006): 2

life' encourages readers to 'admit the truth - that exactly how, when or why earthly life began is a mystery', and goes on to suggest that 'the possibilities of there being life on any one of the planets are infinite'[214]. In an earlier issue, an article by Willy Ley introduces concepts of rocket propulsion with a minimum of technical jargon, using succinct explanatory phrases such as:

> 'The power of a rocket motor is dependent more on the *velocity* of the exhaust gases than their quantity'[215]

In this way, areas of interest such as rocket propulsion and extra-terrestrial life were drawn together, in a journal that attended to both ends of the spectrum of interplanetary science in a tone that would, for the most part, be acceptable to all members of the Society. Although these claims to knowledge continued to be made in *JBIS,* the major limitation of this publication was its short length, whilst the necessary administrative pages further limited the amount of space that could be devoted to interplanetary science. Cleator's ambitions, for one, extended beyond these restrictions, and in the early-1930s he embarked upon writing a book on interplanetary science[216]. This was a culmination of Cleator's early writing on space flight and rocketry, influenced by the experiments of the *VfR* and similar activities in America.

[214] Cleator, P E (1935a): 3 - 4

[215] Ley, W (1934): 11 [italics in original]

[216] Cleator, P E (1936)

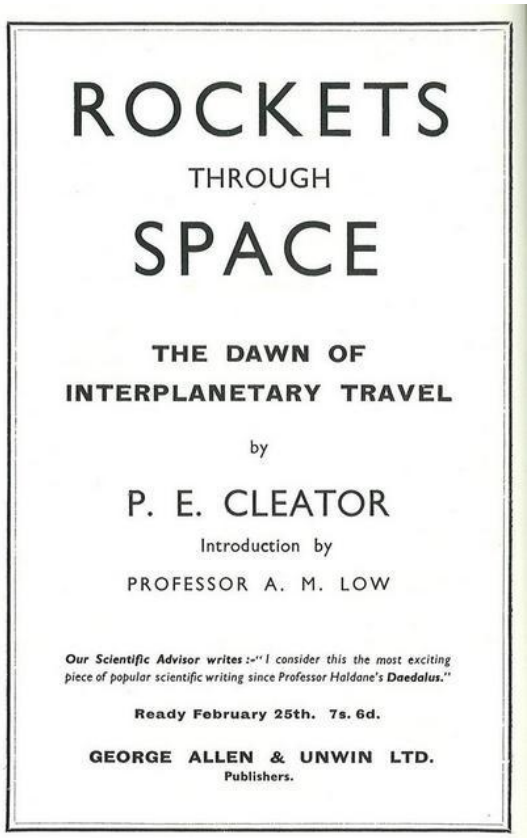

Figure 8 - Advertisement for *Rockets Through Space* appearing in 1936

Source: *JBIS* **3**(1): 12

Rockets Through Space was released in 1936 in Britain by Allen and Unwin (at a cost of 7s 6d), as well as in America by Simon and Schuster (for $2.50). Whilst its contents shall be examined in more detail in Chapter 6, suffice to say here that the overriding theme of Cleator's book was the amalgamation of two areas of scientific knowledge, rocketry and astronomy, into one discipline, which was to become known as 'astronautics'. The book formed an important part of this process of knowledge demarcation that I have been outlining in this chapter, which included the dissemination of the *Journal* and other activities of the early BIS. Through such activities, Cleator and other members of the BIS made conscious decisions about what would be included, and what would be left out, of the discourse of British outer space, and the ways in which this would be done.

As mentioned earlier, alongside the demarcation of thematic content, one of the primary functions of the *Journal* at this time was to enrol people into the emerging intellectual arena of British outer space, by attracting new members to the BIS. To this effect, information on

how to join, alongside specifications of the different membership types, were published towards the back of *JBIS* from the first issue onwards. These classes of membership included 'Fellows' (at £2. 2s. per annum), ordinary 'Members' (10s. 6d.) and 'Associate Members' (5s.). Fellows were required to pay a higher subscription rate, but they were allowed more of a say in the direction of the Society, whilst Associate Membership was a category for those under the age of twenty-one. These suggestive elements worked alongside the physicality of the *Journal* itself, which acted as 'something tangible to send to prospective [members]'[217] and, with its eye-catching cover, would also attract attention through display in members' homes and elsewhere. The dissemination of the *Journal* was made all the more significant through the setting up of a 'journal exchange programme' between the BIS, the American Rocket Society and the *VfR*, which was maintained throughout the pre-war period (see next chapter for a further explanation of this). In this way, members of the BIS would receive not only the quarterly *BIS Journal*, but also the Journals of the American and German societies, whilst members of the overseas societies would get their own copies of *JBIS.*

Also published in the membership section of the *Journal* were lists of new members along with some of their personal details. This practice was abandoned for the period between 1937 and 1939 'owing to the exigencies of space'[218], although some additional information on membership numbers was published for the month of February 1937. Despite the rather *ad hoc* nature of this information, we can compile a simple cumulative tally of members for the duration of the period from January 1934 to February 1937 (see Figure 9).

[217] Cleator, P E (1950): 49

[218] Stop Press (1937): 17

Date	Number of Members[219]
Jan 1934	15
Apr 1934	29
Jul 1934	43
Oct 1934	56
May 1935	70
Feb 1936	80
Jun 1936	104
Feb 1937	147

Figure 9 - Table showing Liverpool-era BIS membership

As we can see, membership numbers gradually approached the 100 mark in the months leading up to June 1936, before jumping to approximately 150 early in the following year, whilst the next recorded total of 269 in December 1946 gives some indication of the rise in numbers during the intervening period. The rise in membership towards the end of the Liverpool era would have been due to a combination of factors, including the dissemination of the *Journal* and the spread of awareness of the Society by word of mouth, but the most significant factor was said to have been the publication of Cleator's *Rockets Through Space* in 1936[220]. Here we can see how two different ways of claiming knowledge can have a positive feedback effect on each other - whereas Cleator's book triggered an upsurge in BIS membership, it was in the *BIS Journal* itself that the book was advertised, whilst the BIS also allowed Cleator the intellectual environment in which he was able to fully explore his ideas in book format.

[219] These records originate from the regular 'list of new members', and the compilation of numbers here does not account for those who may have cancelled their subscription, therefore these figures may be inflated to some extent.

[220] Parkinson, B (2008) (ed): 11

From the 'new members' lists, it can also be ascertained that around one-fifth of the named new members were from overseas (including nine from Europe, nine from the USA, and three from the rest of the world). This is a strikingly large proportion, given the limited locality of the Society's operations in and around Liverpool, although Cleator's desire to reach out to international groups would account for this level of foreign involvement. Furthermore, the 'new members' lists inform us that largest proportion joined as Associate Members, and we also know that some of the 'Founder Fellows', including Cleator and Johnson, were relatively young, being in their twenties at this time. Information in the *Journal* and from other sources also allow some appreciation of the role of women in the BIS in these early years. Although all the main players in the Society have so far been identified as men, there was no clause in any official BIS policy documents excluding women, as was the case with some other organisations such as the Royal Astronomical Society, which was men-only before 1915. Indeed, the founding aims and objectives of the BIS are gender neutral and it is stated in the early *Journal* issues that 'all classes of membership are open to both sexes'[221]. It is difficult to say exactly how many women joined the ranks of the BIS at this time, as the 'new members' lists would usually specify first initials, and occasionally include a 'Mrs' or 'Miss' after the family name, if appropriate. At least five women are listed, however, including 'B Heasley, Mrs.' from Wallasey, 'T E Ashcroft, Mrs.' from Liverpool[222], Ilse Kuhnel from Dusseldorf[223], and, remarkably, 'A M B St. Vincent-Jackson, Mrs.', from Timaru, New Zealand[224]. One early notice also read:

[221] Cleator, P E (1934c): 4

[222] New Members (1935): 6

[223] New Members (1934): 21

[224] New Members (1936): 11

> 'We were very pleased to accept the services of Miss A C Heaton MPS, as Treasurer of the Society. Miss Heaton, incidentally, has the distinction of being the Society's first lady Fellow'[225]

Miss Heaton, a pharmacist, was the only woman out of the fifteen 'Founder Fellows' of the BIS, and her role as Treasurer seems to have lasted until sometime in 1936, when these duties were taken over by the Secretary, Leslie Johnson. The earliest known photograph of members of the BIS was taken in February 1935 for the Manchester newspaper *Daily Dispatch*, featuring the visiting German rocket expert Willy Ley, flanked by two women who are identified as BIS members, and in all likelihood are two of the women identified above.


Herr Willi Ley, a German scientist, who hopes to send a rocket to the moon, explains his schemes to members of the British Inter-Planetary Society at Liverpool. He is on his way to America.

Figure 10 - Press photograph of BIS members taken at the Hamilton Café, Liverpool, including Philip Cleator (far right), Colin Askham (with moustache) and Willy Ley (centre).

Source: BIS Press cuttings book, *BIS Archive* (originally appeared in the *Daily Dispatch*, 2/1935)

Here, Ley is pictured explaining some 'schemes' to those around him, taking on the role of the expert tutor, whilst the other people seem to be engrossed by the papers he is holding. There is certainly no sense that the women are being marginalised or excluded from this encounter. By considering what information there is about the constitution of BIS membership in the period between 1934 and 1937, it can be concluded that a strong youth contingent and a significant internationalist outlook were two of the key characteristics of

[225] Cleator, P E (1934c): 2

the BIS at this formative stage, whilst women, although they represented only a very small proportion of the Society, did have some say in the administration and direction of the BIS.

Whilst the printed output of the BIS provides us with a way of examining the claims to knowledge of the emergent discourse of British outer space, as well as a decent indication of the membership structure of the Society, we must also pay attention to the ways in which these knowledge claims were developed from a geographical perspective, starting with the Society's three and a half years of activities based in the Liverpool area, and charting its relocation to London in 1936/7. Whilst two of the earliest sites of BIS activity, Cleator's laboratory and the solicitor's office, have been described in some detail in an earlier section of this chapter, there are a number of other significant spaces of the BIS that deserve attention here. This can be seen in the timeline (Figure 11), which charts the key locations of the BIS from 1930 to 1970, and can be divided into roughly three sections; the informal gathering places in Liverpool, similar informal spaces in London, and the fixed office space of the BIS from 1952 onwards.

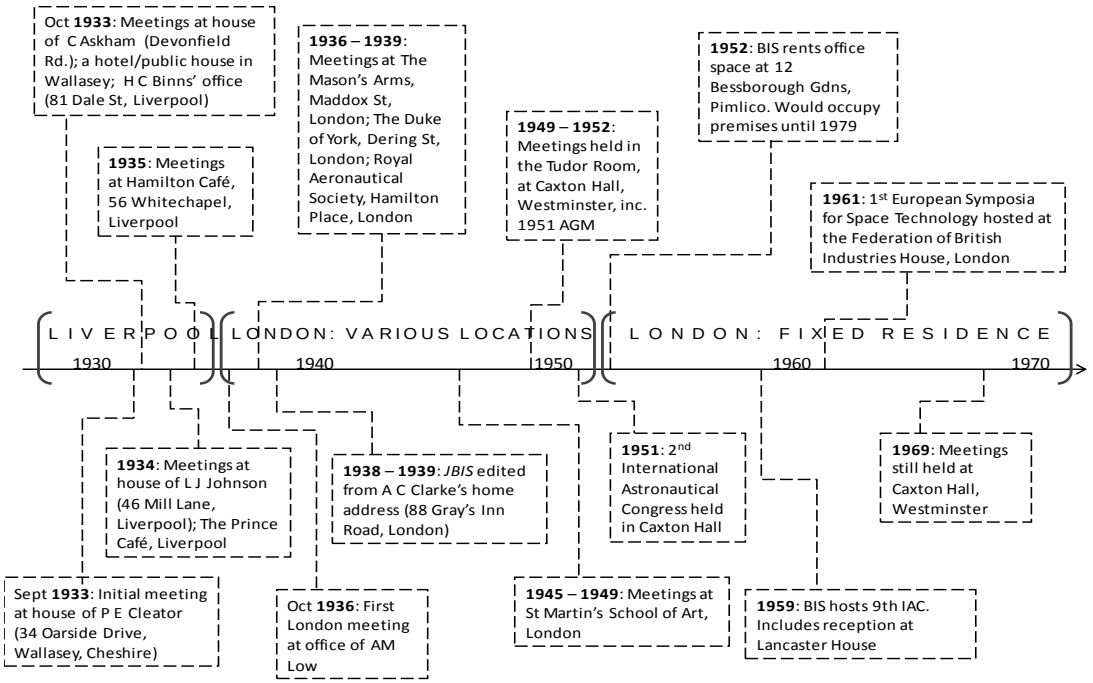

Figure 11 - BIS locations timeline

With this overview in mind, we can take up the story of the development of the BIS as it searched for a regular meeting place in the mid-1930s. Soon enough, the solicitor's office at 81 Dale St, Liverpool, became seen as too stuffy and cramped as more members were drawn to the Society, and meetings were moved to the home of Leslie Johnson at 46 Mill Lane, on the eastern outskirts of Liverpool, and subsequently to the first floor of the Hamilton Café, 56 Whitechapel, Liverpool, by 1935. This was later described by Cleator as,

> 'an unpretentious place, which exactly suited our needs: it was centrally located; it remained open until late hours, it provided light refreshments as and when required; and its charges were absurdly cheap.'[226]

One event recorded by Johnson and Cleator was the visit of the German rocket expert and *VfR* member Willy Ley in February 1935, staying with Cleator as he made his exile from Nazi-controlled Germany to the USA. This attracted a number of reporters to the weekly café meeting, at which Ley gave a lecture to the dozen or so members of the Society who were present (see Figure 10). A few weeks after Ley's departure, some BIS members had a lucky escape at one of their meetings, as they were so engrossed in their discussions that they had not realised that the downstairs portion of the Hamilton Café had been on fire. Fortunately enough, they were able to escape via a staircase that led directly onto the street, without coming to any harm[227]. The staging of BIS meetings tells us something about the outlook of the Society in its early years. Although a few meetings were held at the homes of prominent members in the outskirts of the city of Liverpool, there seems to have been a desire to locate the weekly gatherings in more central public locations, settling down at the Hamilton Café between 1935 and 1936, as numbers slowly grew and adequate facilities were found with

[226] Cleator, P E (1950): 51

[227] Johnson, L J [Unpublished copy of typed memoir]: 40

the right kind of informal atmosphere that would have stimulated discussion about all things interplanetary. As such, there seems to have been a relatively open and relaxed admissions policy, with any interested parties welcomed without the need to prove their credentials. This approach was perhaps also a result of the ways in which the BIS advertised itself, mainly through articles in local newspapers such as the *Liverpool Echo*, as well as through popular science publications such as *Chambers's Journal*.

The BIS in London, 1936 - 1939

During the late-1930s, the BIS could be seen to have become a victim of its own success. Due to the desire to be more than just a local rocket club and the combined success of the *Journal* and *Rockets Through Space*, the Society began to attract members from all across the country, and, inevitably, from the Capital. This, combined with the suggestion that Cleator was considered by other BIS members to be 'playing too large a part in the affairs of the Society'[228], led towards a shake-up in the affairs of the BIS, signs of which can be observed in the June 1936 edition of *JBIS*, when the existence of a BIS 'Council' appears for the first time on the opening page, which contained basic Society information. This Council consisted of seven members, including the two Vice-Presidents, Askham and A M Low, but not Cleator himself. In addition, the following wording appears:

> 'The Council invite contributions to the *Journal* of the Society'[229]

This subtle change in the mode of address, and the exclusion of Cleator, represents a significant move towards more of a consultative or managerial Council system. At the same time, a letter appeared in *JBIS* in which J H Edwards raised the question of whether a London branch should be established. Other London-based members including Arthur C Clarke and

[228] Cleator, P E (1950): 52

[229] The British Interplanetary Society (1936): 14

A M Low added weight to the idea, and the BIS leadership in Liverpool soon came to realise that 'the London branch, numerically twice as strong and undoubtedly better placed to interest influential people, became [their] logical heirs'[230]. This was seen as a more democratic, as well as a more practical, shift in the Society's operations, and by the end of 1936 discussions were taking place about the transfer of the BIS headquarters to London. This move essentially represents the main geographical shift of scientific activity in this study, with the more influential and substantially larger city of London elbowing out the small, provincial city of Liverpool. Interestingly, this move was borne out of a greater weight of numbers in terms of membership, not through a necessity for improved scientific or publishing facilities.

The main casualty of this move was Cleator himself, who reluctantly bowed to the pressure and resigned the Presidency early in 1937, unwilling as he was to re-locate to the Capital. This role was taken up by Low, who held the first meeting of the BIS London branch at his office at 8 Waterloo Place, Piccadilly, on October 27th 1936, at 8pm. According to Johnson's memoir, seventeen members and five friends attended, and Low's office was 'jammed tight', the gathering described by one member as 'an overwhelming, enthusiastic success!'[231]. A photograph of this occasion (see Figure 12), shows the attendees posing in cramped conditions, and, unsurprisingly, the location was not taken up as a permanent headquarters of the BIS.

[230] Johnson, L J (1937): 4

[231] Johnson, L J [Unpublished copy of typed memoir]: 79

INAUGURAL MEETING IN LONDON, OCTOBER 27, 1936.

Back row (left to right): Unknown, C. G. Smith, Allen, *J. G. Strong, Unknown, *R. A. Smith, Unknown, F. Day, *C. Bein, *M. K. Hanson, Unknown.

Front row: Unknown, E. J. Carnell, *A. C. Clarke, *W. H. Gillings, *A. M. Low, Dubois, J. H. Edwards, Miss E. Huggett.

* Present members of the Society.

Figure 12 - The inaugural BIS London meeting, 1936 - Source: *JBIS* **9** (3): 94

Notable figures appearing in this image include a young Arthur C Clarke, the science fiction publisher Walter Gillings, R A Smith, who was to become known for his illustrations of outer space, and A M Low, seated in the centre. However, the immediately striking aspect to this photograph is its male-dominated composition, in contrast with the earlier picture of Willy Ley and a more diverse mix of BIS members (see Figure 10). Furthermore, this image was clearly staged, produced as one of 'a number of group photographs'[232] that followed the inaugural meeting of the London branch of the BIS. It seems as though the photographs were taken to mark this as a significant occasion in the history of the BIS, with posterity in mind, unlike the earlier picture from 1935, which seems more natural and was taken by a photographer to appear in a newspaper. The 1936 image was indeed resurrected by BIS member Harry Ross in 1950, in order to illustrate a retrospective series of articles detailing the pre-war history of the BIS. In this respect, one article in *JBIS* by Cleator recounts the

[232] Ross, H E (1950): 95

Liverpool era[233], whilst Ross takes over in a subsequent issue for the period of 1936 -1939, describing 'the establishment of a numerically strong and enthusiastic Metropolitan Branch'[234]. Ross goes on to correctly describe his illustration as 'a composite', although BIS historian Bob Parkinson has recently uncovered the contents of the two individual photographs behind the montage.

Figure 13 - Two photographs ('A' and 'B') that make up the photomontage - Source: Parkinson, B (2008) (ed) *Interplanetary - A History of the British Interplanetary Society*: 17

The montage (Figure 12), with the division just visible about two thirds of the way across, seems to have been cut in such a way as to remove an 'unknown lady' from the foreground of the image, who can be seen sitting on the left of photograph 'B' in Figure 13. It seems likely that this discrepancy came about through the need for a photographer behind the camera. Whereas, for photograph 'A', the 'unknown lady' would have been taking the picture, photograph 'B' is likely to have been taken by Low, who has vacated his seat in order to do so, to be replaced by the lady, who would have needed somewhere to sit in the crowded office. Further speculation would highlight the blurring and general inattention of those on the left of photograph 'B', and perhaps the lady in question suspected that she would be cut out of the montage, and allowed herself to move, which would have caused the blurring on an autumn evening indoors, when exposure levels would have to have been

[233] Cleator, P E (1950)

[234] Ross, H E (1950): 93

relatively long. Of course, this omission may have been an innocent accident, but the resultant composite at the very least *implies* a deliberate removal of women from the 'front and centre' of the Society. This leaves just one female member, a 'Miss E Huggett', among eighteen men. We do know that Miss Huggett was actually a member of the first London BIS Council, taking the role of Joint Honorary Secretary. Her involvement has been documented by Parkinson in a column about J H Edwards, who is pictured to her right in Figure 13:

> 'by 1936 [Edwards] was living with a Miss Elizabeth Huggett, who for a while he involved in taking on some of the secretarial work for the Society.'[235]

It may have been the case that, when women were accepted on to the governing Council of the BIS, they were only assigned clerical roles such as Treasurer or Secretary, as has been the case with Miss Huggett and the earlier Miss Heaton. In any case, there certainly does seem to be a significant dearth of articles in the *Journal* by female members, and this perhaps is the most effective test of the level of influence women had in the BIS.

This male dominance of the BIS is a pattern that deserves some explanation. The answer is likely to be one of two possibilities: either women were actively discriminated against, or other passive factors from both within and outside of the BIS discouraged women from joining or reaching the higher echelons of the Society. It is unfair to suggest that women would have been less interested in the subject of interplanetary science and, indeed, the wider world of science fiction. Although it has been described as 'rather a puritanical and male-oriented form of literature'[236], science fiction has an established tradition of female writers, dating back to 1818 with Mary Shelley's *Frankenstein*, which is often referred to as the very first science fiction novel. This has continued into the twentieth century, with the

[235] Parkinson, B (2008) (ed): 18

[236] Nicholls, P (1981)**:** 537 - 538

works of the American first-wave feminist Charlotte Perkins Gilman, and into the post-war period with American writers such as Ursula K Le Guin and Joanna Russ, who portrayed feminist utopias as alternate worlds, exploring the role of biology and gender in society. By contrast, the engineering aspect to interplanetary science has been largely dominated by men, and it is perhaps the long-standing perception of engineering as an exclusively male pursuit that has found a way into the discourses of British outer space. In this vein, Daniel Sage has recently claimed that gendered discourses have helped to define male practitioners of space science, in this case American astronauts, as risk-taking pioneers, in opposition to their stay-at-home wives, through the interactions between bodies, risk and technology[237]. One factor counterbalancing the male dominance of Western space science may have been the significant role of women in the production of munitions and armaments during the Second World War[238], although it remains to be seen whether this had a positive impact on women's involvement with the engineering industry more generally, and, by extension, the post-war BIS.

The gendered nature of science is an issue that has been raised indirectly by James Watson in his recollection of how he and his colleagues at Cambridge University identified the double-helix structure for DNA in the early-1950s. The significance of the pub is also revealed in this account, which was unusual at the time of publication for its personal portrayal of scientific practice. Watson famously recalls how his colleague Francis Crick 'winged into The Eagle to tell everyone within hearing distance that [they] had found the secret of life'[239]. As well as a space of public announcement, The Eagle pub in Cambridge served as an important

[237] Sage, D (2009)

[238] Weight, R (2002): 77

[239] Watson, J (1981 [1968]): 115

meeting place for 'lunch after lunch'[240] of informal discussion of practical work undertaken in the nearby Cavendish Laboratory. Later criticism of this account, which remains controversial, highlights the representation of Rosalind Franklin, who made important contributions to Crick and Watson's discovery. Watson portrays her in a negative light, allegedly 'because she refused to exert her feminine charms and, though a mere woman, had the temerity to study DNA like a man'[241]. Taking this example into account, it may be the case that Secord's interpretation of the pub as 'an increasingly male domain'[242] in the nineteenth century may also have resonated into the twentieth century. This is a contention that is backed up by the research of Patrick Chaplin, who, looking at pub darts in the inter-war period, has characterised the public bar as a 'male republic' into which few women ventured[243]. In the case of Crick, Watson and Franklin, it is open to debate as to whether these generalised assertions of male-dominated spaces would have applied, although the more formal spaces of science, in particular the laboratory, are more clearly tainted with associations of female exclusion. Whilst it will be difficult to examine in close detail the nature of such spaces of the BIS in this respect, a certain amount of information is available, and it is important to bear in mind the potential for gendered exclusion in certain spaces as a possible reason for the limited female involvement in the BIS.

Following the inaugural meeting in Low's office, and the settling down of the BIS leadership in London from early-1937, members met 'at least once a week in cafés, pubs, or each other's modest apartments'[244], the most frequented locations being the Mason's Arms and

[240] *Ibid.*: 55

[241] Stent, G S (1981): 162

[242] Secord, A (1994): 282

[243] Chaplin, P (2010)

[244] Clarke, A C (1989): 148

the Duke of York, both in the vicinity of London's Oxford Circus. Whilst group meetings were generally held in public houses, the *Journal* and a new pamphlet entitled *BIS Bulletin*[245] were produced at the shared apartment of Arthur C Clarke and fellow BIS member and science fiction enthusiast William F Temple, at 88 Gray's Inn Road, London[246]. Any activity in Liverpool from 1937 onwards remains unreported, although members across the country were kept informed by, and indeed contributed to, the *Journal*. One of the earliest London meetings was held at the Mason's Arms on Sunday November 15th, 1936 at 7pm, to coincide with the visit to London of Leslie Johnson from Liverpool, who had brought with him the BIS minute book, and offered co-operation with the London group on the task of creating a constitution for the BIS[247]. This meeting helped ensure the smooth transition of the BIS headquarters from Liverpool to London. The term 'headquarters' is somewhat misleading here, since the BIS continued to operate from a multitude of different locations in central London. A young Val Cleaver reflected on two of these gatherings in his personal notes:

> '1/2/38: BIS AGM at Duke of York, Dering St
>
> - During interval, had drink with R A Smith, who described to me his proposed launching device for a space ship ... his idea is to float the 1,000 ton ship in a tank, the tank itself being in the sea, stabilised by buoyancy tanks.'[248]
>
> '17/7/38: Special meeting of the BIS at Duke of York

[245] This pamphlet was issued by the BIS at times when, for logistical reasons, the larger *JBIS* could not be produced. It contained basic information such as notices and announcements.

[246] McAleer, N (1992): 35

[247] The London Branch of the Society - Proceedings (1937)

[248] Personal memoranda: Val Cleaver, 1/2/1938

- [On a visiting member of the American Rocket Society] He had with him his latest (third – first was a flop) rocket motor – fuel cooled (*first I've ever seen!*)... Afterwards we took him (motor included) to a Lyons Corner House, where he spun us some very tall American stories. I liked him immensely – and feel sure we shall hear more of that boy.'[249]

These accounts highlight some of the social interactions within the BIS, with exchanges of ideas, the telling of tall stories and the display of objects constituting an important part of the creative processes in the highly speculative endeavour that was interplanetary thought. The visit from a member of the American Rocket Society, Midshipman Robert Traux (presumably a member of the US Navy) was significant in terms of information exchange between the two societies. Cleaver seems to have been quite excited by the prototype rocket motor; particularly seeing as the BIS was effectively prohibited from working on a physical rocket design by British law. This visit was recorded in a photograph taken outside the house of R A Smith (See Figure 14).

Figure 14 - Photograph of BIS members outside the house of R A Smith - Source: *From Imagination to Reality - An Audio History of the British Interplanetary Society* (2008) [multimedia CD]

[249] Personal memoranda: Val Cleaver, 17/7/1938 [emphasis in original]

The uniformed Traux can be seen examining his rocket alongside the BIS members, including H E Ross (far left), J H Edwards (second from the left), R A Smith (third from the right) and Arthur C Clarke (far right).

During this short time before the outbreak of war, the BIS achieved a great deal of progress in their activities. Its first experimental prototype was produced, a coelostat, which was an optical device designed to make sightings from a rotating spacecraft[250]. This formed part of a more ambitious plan to land three men on the Moon in what became known as the 'BIS Space-Ship'. The seriousness with which this plan was regarded by BIS members is reflected by the physical production of the coelostat prototype, which, given the limited financial resources of the Society, represented the only item that could feasibly be worked upon in relation to the 'BIS Space-Ship' design. This expansive project has been recently described as 'one of the classical pioneering studies in the history of astronautics'[251], and deserves some attention here, as it represented the creative culmination of the work of the pre-war BIS. In an introduction to the project, which took the form of a number of articles in the *BIS Journal,* its authors are described as 'practical idealists [who] have enough technical knowledge to know that Space *can* be crossed, and enough idealism to believe it worthwhile'[252].

The essential concept of the design was based on the correct assumption that the majority of a space ship's overall mass would have to consist of the fuel itself, and therefore, according to the calculations of lead designer Harry Ross, a one tonne space ship would require 1,000 tonnes of fuel to take it to the Moon and back[253]. In a design that was said to

[250] Smith, R A (1939)

[251] Parkinson, B (2008) (ed): 18

[252] Temple, W F (1939): 3 [italics in original]

[253] Ross, H E (1939)

be ‘a radical departure from all previously conceived ideas of a space-ship’[254], this man-carrying rocket would be propelled by powder fuel arranged in hundreds of small honeycomb-like pockets, which would each be discarded once they had burnt out. As such, the concept for a multi-stage rocket, which eventually became a standard design, was consolidated. This is a crucial conceptual development in space flight design, as the principle of shedding empty fuel containers as ‘dead weight’ greatly improves the efficiency of the rocket as it escapes the Earth’s atmosphere. The iconic design adorned the front cover of *JBIS* in the January 1939 edition:

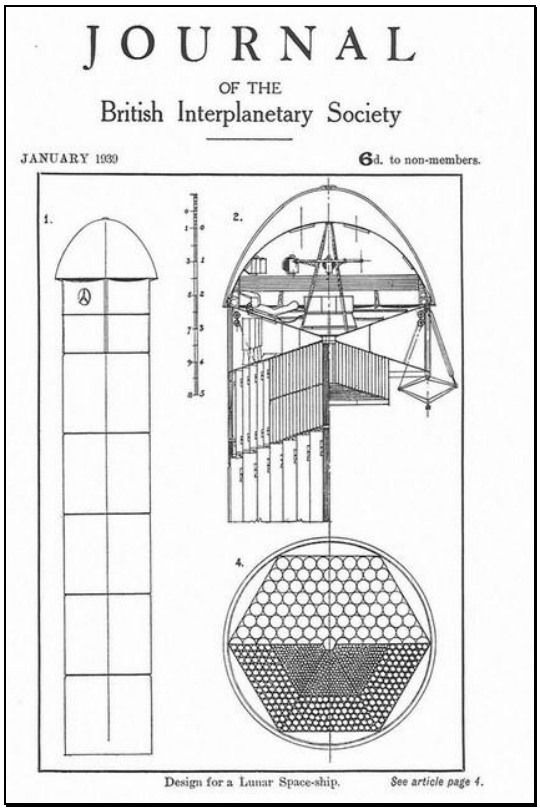

Figure 15 - Cover of *JBIS* featuring the ‘Lunar Spaceship’

Source: *JBIS* **5**(1)

Here we can see the honeycomb structure of the powder cell propulsion system (bottom right), with cut-away diagrams on both a horizontal and vertical cross-section revealing the inner components of the proposed rocket to the reader. Also visible is the human compartment (top right), providing enough space for three passengers and a payload

[254] *Ibid.*: 4

including supplies of hydrogen peroxide, intended to be used as a source of water and oxygen, culinary supplies including 'food in sausage form contained in thin edible skins', navigational instruments, as well as scientific instruments for use on the Moon including 'a fairly powerful telescope' and 'accessories for examination of mineralogical specimens and possible spores, lichens or other forms of life'[255]. Here we can gain an appreciation of the level of thought and detail that went into the proposal, whilst the nature of the research that was expected to be carried out on the Moon straddled scales from the microscopic to the galactic.

The scope and complexity of this study reflected a general trend that can be found when examining the *BIS Journal* for the London pre-war era, in that the topics that were examined by BIS members became increasingly specialised, and were subject to more advanced levels of research, albeit mostly research of a highly speculative and mostly theoretical nature. It therefore seems that the nomadic tendencies of the BIS during this period did not hinder the activities of the Society; indeed, its social and informal character seems to have helped generate interest and discussion about interplanetary matters during this time, in a pattern that was to be resumed after the war had ended.

Official accounts of informal gatherings of the BIS are hard to come by, and therefore other sources such as personal memoirs have had to be relied upon so far in this chapter. However, published accounts of similar encounters can be found in some of the fictional works of Arthur C Clarke, particularly in his 1957 *Tales From the White Hart*. This is a collection of short stories based on the encounters he had in London in the 1930s and 1940s with members of the science fiction community, which was said to have shared an '80 per

[255] Hanson, M K (1939): 10 - 16

cent overlap' with members of the BIS at this time[256]. In the preface to this collection of short stories, Clarke recalls how:

> 'Readers often ask me if the 'White Hart' actually existed. Well, it did; I based the background on the White Horse, Fetter Lane, just north of Fleet Street in London ... this was the weekly rendezvous of the London science-fiction community.'[257]

Although it must be remembered that what follows are fictional accounts, whereby Clarke undoubtedly exaggerated actual events to a certain extent, extracts from these stories serve as an indication of the kind of atmosphere in which science fiction fans and BIS members met, interacted and discussed their interplanetary ideas. One extract describes the layout of the 'White Hart':

> 'The public and saloon bars are on the ground floor; there are the usual vistas of brown oak panelling and frosted glass, the bottles behind the bar, the handles of the beer engines. Nothing out of the ordinary at all.'[258]

Clarke characterises the pub as an ordinary place where extraordinary tales are told, but he also provides insights about the type of people and activities that were to be found there:

> 'I would not like you to think that all our conversations are highly erudite and scientific, and our activities purely cerebral ... The *Times Literary Supplement*, the *Saturday Review*, the *New Statesman* and the *Atlantic Monthly* may be brought in by some of the customers, but the same people are quite likely to leave with the latest issue of *Staggering Stories of Pseudoscience* ... A great deal of business also

[256] McAleer, N (1992): 129

[257] Clarke, A C (1972c [1957]): 6

[258] Clarke, A C (1972d [1957]): 9

goes on in the obscurer corners of the pub. Copies of antique books and magazines frequently change hands at astronomical prices.'[259]

Here we have a fictionalised account of how the pub was used in unconventional ways through the processes of information exchange, the swapping of items, and scientific discussion. We can also see how the pub in some ways acted as a leveller for different types of people, including those who read high-brow current affairs journals, as well as readers of science fiction pulp magazines. Such fictionalised interactions can be triangulated with the direct accounts of BIS members such as Val Cleaver, quoted earlier, and Harry Ross:

'Members of the BIS met in many strange places - some of them palatial, some of them markedly otherwise, most of them pubs - but the London Originals will, I think, always retain a nostalgic affection for the 'Space-Shipper's Arms' as we came to call it ... About all I can remember is a sea of thirty fantastically assorted faces, an incredible aroma of fish, beer and tobacco, a glass-fronted wall-case of toy soldiers, and a heck of a noise.'[260]

In this kind of atmosphere, the telling of stories was a key component of the semi-technical discussions that were held in the margins of any official business conducted by the BIS and science fiction groups. Indeed, these unofficial activities probably would have taken up more time than any structured group announcements, particularly given the alcoholic lubrication and general atmosphere of conviviality that can usually be found in the public houses of central London.

[259] Clarke, A C (1972b [1957]): 28

[260] Ross, H E (1950): 95 - 96

Post-war BIS: Amalgamation, professionalisation and historicisation

The BIS, like other organisations, had its very existence threatened by the onset of war in 1939, and the fact that it re-grouped successfully after the conflict is a testament to the passion of those involved, their belief in the cause of interplanetary science and their ability to communicate this to the members of the public who then became BIS members. Although the BIS suspended all official functions on the outbreak of war, some of its members remained in contact, and by 1944, discussions between Cleator, Clarke, R A Smith and Eric Burgess had taken place concerning the resurrection of a post-war interplanetary society. Burgess, who was to become a post-war Chairman of the BIS, had founded the Manchester Interplanetary Society in 1936, which had seventeen members, with an average age of seventeen. Also active at this time was the Paisley Rocketeers' Society, founded in the same year by secondary school pupil John Stewart. Despite its inherent youth, the PRS succeeded in creating a three-stage rocket adapted from fireworks, which was said to have attained flight range of over 800 feet[261]. Part of the process of knowledge consolidation through which the BIS re-emerged in 1945 included the amalgamation of smaller societies such as these, and the enrolment of members such as Burgess to prominent positions in the BIS. This not only re-enforced the membership base of the Society, but also gave greater authority to the BIS on its claims to knowledge in interplanetary science. Similar amalgamations have been observed in the development of other intellectual groups, such as the Royal Geographical Society, which absorbed the African Association, the Raleigh Club and the Palestine Association in the nineteenth century as it sought to consolidate a discipline of geographical knowledge[262].

[261] Parkinson, B (2008) (ed): 23

[262] Cameron, I (1981)

Having successfully re-grouped in this way, with its headquarters remaining in London, the BIS registered itself as a 'private company limited by guarantee' in 1946[263], which was a way for the Society to attain legal accreditation as an individual entity as opposed to a group of individuals. Older learned societies would typically have attained this accreditation by applying for a Royal Charter, as the Royal Astronomical Society successfully did in 1831. This represented an important step in the professionalisation of the BIS, which was borne out of a desire to be seen as a more organised and scientifically credible society. A core group of members consisting of Arthur C Clarke, Eric Burgess, Val Cleaver, R A Smith and Les Shepherd ran the BIS in this immediate post-war period, with the decision-making power resting with the BIS Council in a move away from the pre-war Presidential system, whilst the Chairmanship of the Council alternated from year to year. It is difficult to gauge the practical influence of the wider BIS membership at this time, and despite attempts to involve more members in the running of the Society from the late-1930s, Harry Ross later admitted that,

> 'One of the greatest difficulties under which the officers of the Society laboured was the impossibility of finding out what *did* interest the bulk of the membership ... we did occasionally get suggestions and criticism, but for the most part the Council had to settle the activities of the Society with little exterior guidance.'[264]

This account suggests that, for the most part, ordinary BIS members were happy to pay their subscription rates, receive their copy of the *Journal*, and attend the odd meeting, if they were in the right vicinity, leaving the decision-making and article-writing to a core group of members, who, between them, had a roughly equal say about the direction of the Society.

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[263] From Imagination to Reality - An Audio History of the British Interplanetary Society (2008) [multimedia CD]

[264] Ross, H E (1950): 96 [italics in original]

It has been possible to collate accurate records of BIS membership numbers on a more reliable basis for the post-war period, when data were regularly published in the *Journal*. This formed part of the newly instigated Annual Review, which included a Chairman's report on the past year, along with published accounts and other information that was presented at the AGM. Based on these figures, the following record has been compiled (See Figure 16 and Figure 17):

Year	Number of Members
1946	269
1947	444
1948	502
1949	577
1950	925
1951	1,491
1952	2,010
1953	2,419
1954	2,419
1955	no data
1956	2,717
1957	2,813
1958	3,188

Year (cont.)	Number of Members (cont.)
1959	no data
1960	no data
1961	3,292
1962	3,232
1963	3,036
1964	2,860
1965	2,710
1966	2,657
1967	2,934
1968	2,933
1969	2,810
1970	2,851

Figure 16 - Table showing post-war BIS membership numbers from 1946 to 1970

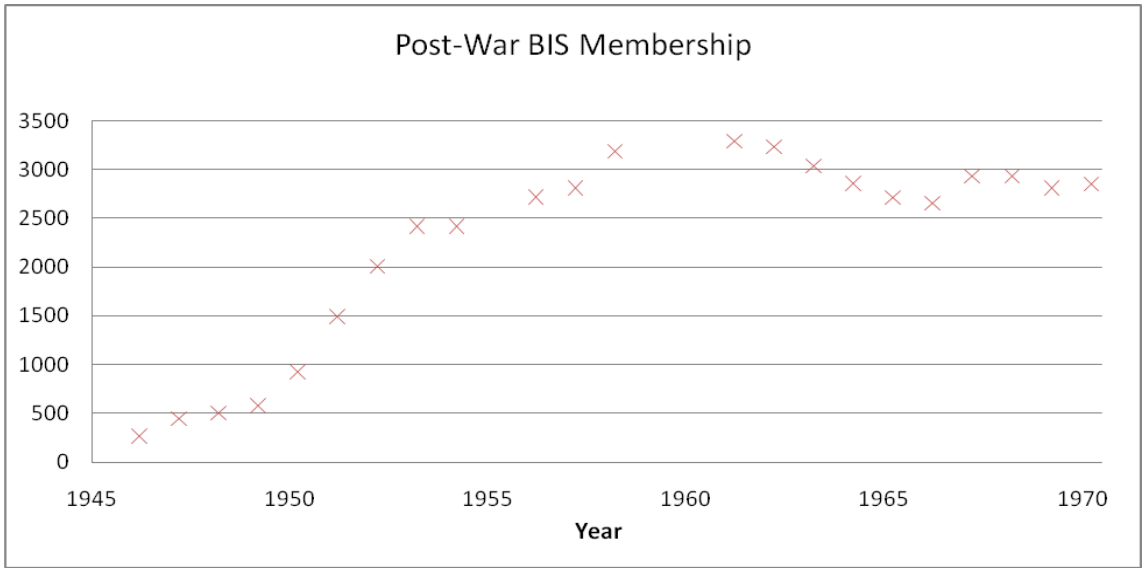

Figure 17 - Graph showing BIS membership numbers from 1946 to 1970

These figures demonstrate the Society's rapid expansion in the late-1940s and 1950s, during which membership numbers went from 269 in 1946 to 3,188 in 1958. By the early-1960s the numbers had levelled off, and there is only a slight resurgence in the mid-1960s, in the lead up to the Apollo Moon landings. This suggests that the membership of the BIS had reached a natural plateau around the 3,000 level, although it must be remembered that other external factors may have also had an impact on membership levels. This level of popular influence is significant, and is comparable to groups such as the Royal Geographical Society, whose membership at the turn of the twentieth century amounted to 4,500, before suffering a slight decline after the First World War, and gradually rising again to 7,000 by 1980[265].

The rapid growth in membership in the early post-war period has been attributed to 'a growing increase in public awareness of astronautics'[266], which stemmed from a number of different factors including the publication of new books aimed at a popular audience such as Arthur C Clarke's *Interplanetary Flight* (1950), which is thematically similar to Cleator's *Rockets Through Space* (1936). Perhaps most importantly, however, the science of rocketry started to be taken more seriously in both public and specialist arenas at this time, alongside a more general dispersal of technical knowledge resulting from certain wartime advances such as radar and jet propulsion. Whilst members of the public in certain parts of Britain became all too aware of the destructive capabilities of rockets during the closing stages of the Second World War, as discussed in Chapter 6, those in technical circles learned about the potential of rocketry as it developed in different directions in the early post-war period. In the western world this included upper atmosphere research and the development of inter-continental ballistic missiles, before space flight itself was achieved by the Russians in 1957, and by the Americans in the following year. Related to these advancements was the

[265] Cameron, I (1981): 259

[266] Parkinson, B (2008) (ed): 45

involvement of British aeronautical engineering companies such as Saunders-Roe, Rolls Royce and Hawker Siddeley in the development of British rockets such as Blue Streak and Black Knight at the Woomera rocket range in Australia[267]. From the mid-1950s onwards, advertisements for these companies appeared in BIS publications, including the following full-page notice in *Spaceflight* (Figure 18):

Figure 18 - Hawker Siddeley advertisement in 1960

Source: *Spaceflight* **11**(5): 162

This demonstrates a new association between the BIS and professional engineering organisations that were starting to become interested in space flight, a connection that would have been unheard of before the war. In addition to these direct applications of rocketry to the emerging space flight industry, aeronautical engineering continued to develop beyond the internal combustion engine / propeller combination. A key advancement was the jet engine, which was first used in the military, then in civil aviation with the de Havilland Comet becoming the world's first commercial jet airliner in 1952. In

[267] Hill, C N (2001): 11

this respect, the term 'aerospace engineering' was first defined in 1958, considering the Earth's atmosphere and the space above it as a single realm for development of flight vehicles[268], as the fields of knowledge connected to outer space started to become well established in organisations outside of the BIS.

Alongside this increasing professionalisation of the BIS and related technical discourses, it is interesting to note the level of self-historicisation within the Society, once it had re-formed after the war, which primarily took the form of two articles published in subsequent 1950 editions of *JBIS,* when the Society was still under twenty years old. Part of this need to re-connect with its past would have been due to the duration of the Second World War, and the resultant need to document moments in the Society's pre-war history which may otherwise have been forgotten. However, another aspect to this self-historicisation would have been a desire to maintain a historical consistency that would legitimise the existence of the BIS, providing it with a solid intellectual heritage. In a practical sense, this manufactured continuity also served to pave over the disjunctures in the Society's past, seeing as it was, essentially, a different organisation in 1937 from that in 1936, and, indeed, different again in 1945 on quite fundamental levels. The desire of the BIS Council in 1950 to document this history is made clear in Cleator's opening words from his retrospective article on the formation of the Society, which he wrote whilst 'stewing and steaming in the African tropics'[269]:

[268] Encyclopædia Britannica (2010) [online]

[269] As Cleator became less involved in the affairs of the BIS, his activities are more difficult to trace. He is known to have spent time in South Africa, and he continued to write books on various subjects, including his *Into Space* (1953), *The Robot Era* (1955) and *Weapons of War* (1967). His contributions to interplanetary science were acknowledged with his election as a member of the International Academy of Astronautics in 1985.

> 'I am, I suppose, the only person who can give a reasonably full and comprehensive account of the Society's early history, and from a stream of messages which have pursued me half-way around the world, I gather that there is some anxiety in London lest I suddenly depart this life, leaving the tale untold.'[270]

Other articles also drew on the 'history' of astronautics around this time, including a number of profiles of prominent pre-war personalities in rocketry, who were eulogised not only as current experts in the field of interplanetary knowledge, but as historically significant figures. One such account profiles 'Prof. Dr. Wernher Von Braun', who had been elected as an Honorary Fellow of the BIS in 1949:

> 'History will record that after the great pioneers laid the theoretical basis of the science of astronautics ... one man was chiefly responsible for a sweeping advance which at once moved the whole subject into the realms of practical engineering. That advance was the A-4 (or V-2) rocket, and the man was Wernher Von Braun.'[271]

This account, accompanied by a full-page portrait of Von Braun, highlights the subject's connection to the V-2 rocket, of which he was the intellectual driving force. Interestingly, the V-2 is portrayed as a technological leap forward, which it undoubtedly was, but no mention is made of the disastrous impact that this weapon had on London and the south of England just five years earlier at the end of the Second World War. Far from being demonised for his highly significant wartime role for the Nazis, Von Braun is praised for his accomplishments in the field of rocketry. The tone of this article, and the motives behind it, point towards this call for the BIS to account for a genealogy of the field of knowledge in which it now claimed to have authority. As a result, the basis of the Society's existence is re-enforced, in a pattern

[270] Cleator, P E (1950): 49

[271] Prof. Dr. Wernher Von Braun (1950): 57 - 58

that was to be repeated. Indeed, one of the first series of articles in *Spaceflight* was on the 'Fathers of Astronautics', including profiles of pre-war rocketry pioneers including Robert Goddard and Hermann Oberth, and the process of self-historicisation seems to have been a powerful and enduring way in which the BIS attempted to delineate and take ownership of this field of knowledge.

A further indicator of the increased professionalism of the BIS in the post-war period is the appearance of audited accounts, which were published in the Society's Annual Reviews from 1946 onwards. These accounts indicate that, between 1947 and 1964, the consistent main source of income was from member subscription fees. For example, for the year ending 1947, the following was recorded[272]:

Income

Subscription fees: £470

Other fees: £58

Donations: £117

Sundry Receipts: £87

Total: £733

With the rapid increase of membership in the early-1950s came ever larger receipts from subscription fees, and other new types of income, through which the BIS was able to accumulate a substantial financial reserve. Whilst revenue continued to grow during this period, expenditure was kept relatively low due to the voluntary basis of much of the administrative work of the Society, with publishing costs for the *Journal* making up the majority of the expenditure.

[272] Annual Report of the British Interplanetary Society (1947)

One of the additional sources of income during this period of expansion was library subscriptions, which first appeared in the accounts for 1951, and was a regular and increasing source of income from then on. The library proved to be useful for the Society in a number of ways, not least of which was its value as a form of intellectual capital and a means of spreading knowledge about interplanetary science. Books that were to be destined for the BIS library gradually accrued from 1946 onwards, by purchase, through the acquisition of review copies and through donations, including,

> 'a magnificent collection of rare and valuable astronautical works [donated] by M. Esnault-Pelterie and Dr. Sänger'[273].

This growing collection was presumably housed with one of the BIS Council members during this period, and by 1950 a lending and copying service was initiated, with 40 books available for loan to fellows only. Once this service was successfully established, more books were made available to all members, and by the time the library was re-housed in the new offices at Bessborough Gardens in 1953, 'more than 1,000 articles and 200 books [had] been sent out'[274].

Alongside the more effective keeping of membership and financial records, the administration of the BIS was placed on a more professional setting from 1945 onwards, as the Society attained a registered office at Albemarle House, Piccadilly. The BIS began a search for permanent headquarters in the early-1950s, and started holding their meetings in more formal locations, including at the Royal Aeronautical Society[275] headquarters at Hamilton Place, near Hyde Park Corner; at St Martin's School of Art and at Caxton Hall in

[273] Annual Report of the British Interplanetary Society (1949)

[274] Annual Report of the British Interplanetary Society (1952)

[275] The RAeS was founded in 1866 as the Aeronautical Society of Great Britain, and obtained its Royal Charter in 1918.

Westminster[276]. The activities that took place were also more varied, and came to include monthly lectures, which, by their nature, required larger, more private settings than the public house (See Figure 11). These locations were all used until 1952, when the search for permanent accommodation led to the BIS renting an office at Bessborough Gardens, further out from Central London in Pimlico. This consisted of two large rooms on the ground floor at a rental of £150 per annum. Apparently, when enquiries were first made about the property,

> 'Eyebrows were raised at the thought of letting it to a Society with such a peculiar name as our own. The Lessor was not too amused. He required, insisted, that the property be let to "a person of quality". The "person of quality" was produced, in the form of Arthur C Clarke!'[277]

This recollection in some ways exemplifies the tensions that the Society was trying to resolve in the immediate post-war period, as its reputation had a direct effect on the geography of the BIS itself. The move to permanent accommodation thus not only improved the image of the Society, but added the enormous advantage of having a central address and phone number, which helped greatly in its day-to-day administration[278]. This became all the more important as membership numbers grew rapidly, to well over two thousand by 1953. Although the office was set up mostly to deal with correspondence and to house the Society's growing library, meetings were held at more convivial locations, including at 'Arthur Clarke's digs'[279], whilst the Mason's Arms continued to serve as a suitable meeting place. By this time, it had been decided that the Society's finances were in good enough health to start

[276] Thompson, G V E (1979): 403

[277] Carter, L J, quoted in Parkinson, B (2008) (ed): 43

[278] Clarke, A C (1953a)

[279] Shepherd, L, quoted in From Imagination to Reality - An Audio History of the British Interplanetary Society (2008) [multimedia CD]

to employ a secretary to deal with the administrative work, operating from Bessborough Gardens. The continued increase in membership subscriptions, and a steady contribution from member donations, made it possible for the BIS to build up substantial capital, which by 1964 was worth £10,502, along with additional investments of £9,000[280]. This eventually led to the Society being able to purchase property for the first time in 1979 at 27/29 South Lambeth Road, Vauxhall, where the BIS still resides at the time of writing.

[280] Annual Report of the British Interplanetary Society (1964)

Chapter 5

The Geopolitics of British Outer Space

The aim of this chapter is to show how some of the fundamental issues in twentieth century geopolitics are reflected in the discourses of British outer space, particularly through the activities of the British Interplanetary Society, as well as other connected sources. In this way, modes of geopolitical thought that I aim to identify include a notion of British scientific internationalism, the adoption of New Elizabethanist discourse, and a progressive sense of Britain's role in the world in relation to ideas of the Commonwealth and Europe.

Pre-war international networks of knowledge

From the very first publications of the BIS, a clear sense of scientific internationalism comes across, and was an enduring theme right through to the 1960s. This is interesting with respect to the subject of the Society's enquiries – the exploration of interplanetary space - as outer space has been associated with internationalist discourses in ways that other narratives of exploration, with one or two exceptions, have not been in the past[281]. The general feeling that outer space should be a space of peaceful international co-operation has since become accepted rhetoric following the creation of the United Nations Committee on the Peaceful Uses of Outer Space in 1958, which emerged as a result of growing tensions in the Soviet – American 'space race'. However, activity in the BIS in the 1930s foreshadowed the onset of space exploration with remarkable vision and enthusiasm, and promoted an agenda of scientific internationalism, influenced by the experiences of Philip Cleator in the years leading up to the founding of the BIS in 1933.

[281] Naylor, S and Ryan, J (2010) (eds)

Cleator became aware of the pioneering work of Professor Robert Goddard in the USA, who, in 1912, 'showed that it was technically feasible to shoot a rocket, propelled by explosives, to the Moon'[282], and later undertook the first practical experiments with liquid-fuelled rockets. Whereas Goddard's work was of a solitary nature, 'the advance of technology was increasingly moving into a new age where the co-operative effort of teams of workers would count for more than any individual effort'[283]. In this spirit, like-minded rocket enthusiasts in Germany grouped together to form the *Verein für Raumschiffahrt* (*VfR*), in 1927. This organisation attracted engineers, scientists and laypersons, not only from Germany but from other countries[284]. Influenced by the work of Goddard and others in the American Interplanetary Society, Cleator pursued his interest in interplanetary science by visiting the rocket and outer space enthusiasts in Berlin in January 1934. Unfortunately for Cleator, by that time the *VfR* was defunct, essentially taken over by the German Army, with its leading members having 'resigned in protest and disgust'[285]. In spite of this, Cleator successfully met up with his contact, Willy Ley, who we encountered in the previous chapter making a visit to Liverpool in 1935. This trip formed part of Ley's exile from Germany to America, which was recommended by Cleator as 'a more inviting haven of refuge' than Britain. Furthermore, it turns out that Cleator had himself travelled back to Germany to 'escort him safely over the frontier'[286], seemingly at considerable risk to his own safety, only to miss the agreed rendezvous, and return to England, Ley making it into Britain later by his own means. Cleator further helped his German friend by writing to Edward Pendray of the American Rocket Society, asking for his assistance upon Ley's arrival in America. Indeed, Ley must have made a

[282] Cleator, P E (1933): 49

[283] Parkinson, B (2008) (ed): 6

[284] Geppert, A (2008): 267

[285] Cleator, P E (1950): 50

[286] Cleator, P E (1986): 155

very favourable impression on his English guest in 1934, and Cleator wrote enthusiastically about his visit to Berlin, recounting that:

> 'Thanks to Herr Ley, I was able to obtain introductions to many of the leading experimenters throughout the world ... Here are famous men freely devoting their valuable time to an immature foreign organisation, while our own countrymen, for the most part, have evinced not the slightest interest. Such generosity of action ... exemplifies the true international nature of the scientific spirit.'[287]

The experts Cleator refers to include the rocket pioneers Robert Esnault-Pelterie from France, Hermann Oberth from Germany and Guido von Pirquet from Austria, and this spirit of international co-operation was lauded by Cleator as an important aspect of research into space flight. The type of internationalism that Cleator promotes is identified in other European countries, but is perceived to be lacking at home, not just by the government, but by 'countrymen' all over Britain.

Throughout Cleator's early accounts in *JBIS*, whilst occasionally remarking on the British government's lack of interest, he makes scant reference to the looming presence of the German state, which developed 'a symbiotic relationship between the army and the rocket programme'[288] towards the mid-1930s. Indeed, several influential rocket scientists who eventually worked on the wartime German 'V' rockets gained experience as members of the *VfR* in the late-1920s and early-1930s, including Wernher von Braun and Hermann Oberth. Cleator was more interested in setting up lasting connections between rocket and space enthusiasts across the world, and made contact with rocket societies in America, Italy, France, Austria and the USSR. As mentioned elsewhere in this thesis, one of his schemes was

[287] Cleator, P E (1934)Editorial, Journal of the British Interplanetary Society **1**(2): 14

[288] Millard, D (2008) Audio History of the BIS, Part 1: Origins

to develop a journal exchange programme as part of his desire to establish 'a free exchange of vital information between the rocket societies of the world'[289], whilst he also penned an article for the Journal *Das Neue Fahrzeug* (published in Germany by former members of the *VfR*) in June 1934 on the subject of rocket research in Britain[290]. Further employing this spirit of internationalism, Cleator wrote of efforts 'to establish radio communication between members of the world's rocket societies'[291]. Amateur radio was a popular hobby amongst BIS members in the 1930s, with several members' call signs displayed in the *Journal*, such as the Society's first Vice-President Colin Askham, who was 'known all over the world as G6TT'[292]. In the days before the first transatlantic telephone cables, which were laid in the 1950s, radio communication in this manner would have taken on a greater significance, and was seen by Cleator as a crucial modern method of communication across the globe.

Cleator's passion for internationalism further comes across in his correspondence with the American literary critic Henry Mencken. This developed after Cleator sent Mencken a copy of his book *Rockets Through Space* in 1936, and the two continued to exchange letters, whereby Cleator would occasionally send newspaper cuttings of interesting English phrases, and the two would discuss their experiences of the war and other matters, until Mencken's declining health brought an end to the exchanges in the late-1940s. In a letter of August 1942 Cleator describes a scene of destruction that followed the bombing of his home town of Wallasey, in which his house was destroyed:

[289] Cleator, P E (1934a): 14

[290] Cleator, P E (1950): 52

[291] Cleator, P E (1934a): 16

[292] Cleator, P E (1934c): 3

'... The tattered remains of a worldwide correspondence, littering the entire block ... The thought that hundreds of the letters were written in German, Italian and Russian, and that some idiot would be sure to denounce me as a spy ...'[293]

Cleator ends his harrowing description, which includes details of his parents' death, with a phrase in German:

'*Was wird das Ende sein? Wer gewinnt aus allem? Wer weiss ... ?*'[294]

In this way, Cleator's humanist internationalism was applicable in both war and peace, although this stance was not limited within the BIS to Cleator himself. During the pre-war era, the Society is said to have taken 'a paternal interest in Ido (reformed Esperanto) as an international language', and, as a result, an article by Leslie Johnson called 'Space Rockets' or '*Space-Fuseli*' concerning the aspirations of the BIS was published in *The Ido Magazine*[295], whilst an advertisement for '*Centerbladet* - a journal with a special appeal for all interested in international language problems' appeared in *JBIS*, encouraging those interested to write to 'The International Language (Ido) Society of Great Britain, 8 Kings Avenue, Woodford Green, Essex'[296].

This positive process of international information exchange at group-level is contrasted with somewhat antagonistic references to the presence of national governments, whose 'hydra-headed regulations' were a constant source of irritation to Cleator[297]. Having written a letter lobbying the British government's Air Ministry to undertake research into rocket propulsion,

[293] Cleator, P E (1982): 133

[294] Translated as: 'What will the outcome be? Who gains by all this? Who indeed ... ', Cleator, P E (1982) (ed): 133

[295] Johnson, L J [Unpublished copy of typed memoir]: 36

[296] Rockets Through Space [advertisement] (1936)

[297] Bode, C (1982): 11

a response from an Under Secretary of State pointed out that rocketry was not seen as a viable line of research, because there was 'no indication that this method can be a serious competitor to the airscrew-engine combination'[298]. Adding to Cleator's frustration was the sense that this official seemed to be missing the point, in that the rocket was never intended by the BIS to be used for conventional flight. Finding similar misconceptions in the national press, Cleator points out in a sardonic tone:

> 'I feel constrained to consent that there is *not* a distinct possibility that Mars may be annexed to the British (or any other) Empire in the not too distant future ... Exaggerated statements of this sort do great harm.'[299]

Here, it is made clear that fantastic accounts of the potential of space exploration were not in the ethos of the BIS, which was more interested in what were seen as the realistic possibilities of space flight, based on accurate extrapolations of current thought. The other point to take from the above remark is Cleator's criticism of the press for associating the possibility of space flight with imperial expansion. He does this despite the fact that the press was instrumental in the setting up of the Society, with Cleator's 1933 letter in the *Liverpool Echo*, as well as a follow-up interview in the national *Daily Express* resulting in the first influx of members. It is clear that what was *not* anticipated, or promoted, was a type of state-run imperialistic conquest of space, an idea which has been presented by one historian of the space race as 'a vertical empire'[300]. It seems that the BIS wanted the fledgling space flight societies of the world to be connected intellectually, through traditional correspondence including 'International Interplanetary News', which was established as a regular column in *JBIS* from 1934, as well as through modern technologies such as radio, and even the

[298] Quoted in Cleator, P E (1934a): 15

[299] Cleator, P E (1934d): 120

[300] Hill, C N (2001)

international language of Ido. The purpose of this would be to effectively create what Cleator called 'an international rocket society'[301], and the role he assigns himself and the BIS is that of facilitator, allowing this international federation to emerge and pave the way for the conquest of space.

Whilst the pre-war BIS made active attempts to engage with the idealistic project of the international language, another more widely documented venture that can be compared to Cleator's anticipated 'international rocket society' is the early-twentieth century plan to create an international map of the world. Pearson *et al*. have suggested that this project 'was designed to challenge the idea that cartography was an inherently national science undertaken by, and for, specific nation states'[302]. At first pre-empting, and later drawing on inter-war efforts to establish an international world order that would replace the Western European empires, the international map of the world sought to standardise by international agreement cartographic representations of the world on a 1 : 1 million scale in what, for some, represented the 'ultimate sublime fantasy' of a global twentieth century. Cleator's anti-governmental instinct shared certain similarities with this project, whilst tensions between the idealistic end-results and the practical impossibility of true internationalism are revealed in both stories, alongside a reluctance displayed by the emerging global superpowers as they pursued their own national agendas.

An international British outer space

A major change to the operations of the BIS occurred in 1936, when members of a newly created London branch orchestrated a move of the headquarters from Liverpool to the Capital, as recounted in the previous chapter. As a result, Cleator resigned as President, as he

[301] Cleator, P E (1934a): 14

[302] Pearson, A *et al.* (2006)

would not move south from his home town, and A M Low became the Society's President from 1937 to 1939. Despite Cleator's marginalisation, internationalist visions continued to be held by the BIS at the inaugural meeting of the BIS London branch in 1936, with one influential member, J H Edwards, raising the possibility of 'a united International Astronautical Society'[303], composed of all the space flight societies in the world, as an alternative to the foreseen 'consternation amongst the governments of the world should any particular country succeed in the conquest of space'[304]. Given the fairly small size of the BIS in the 1930s, and the limited spending power of the space flight societies around Europe, this early vision of an international space flight society as well as other plans remained relatively underdeveloped, and suffered a major setback with the outbreak of war in 1939.

The members of the London-based BIS dispersed for the duration of the Second World War, taking up various military and civilian roles. The remote bombing of London during the final months of the war introduced Britons to the effects of rocketry in a terrifying and deadly manner. In the summer of 1944, London and South East England were assailed with a new German menace, the V-1 missile, known to Londoners as the 'flying bomb', 'robot plane' or 'doodlebug', which was launched from the Northern European coastline, with over 2,500 reaching London and the South East[305]. This missile, smaller than the more widely-recognised V-2, with short winglets, was said to emit 'an unmistakable Thrum Thrum' noise as it travelled quickly overhead, the more dreaded sound being the cutting out of the engine that signalled its imminent detonation. In comparison to 'the Big Blitz' of 1940-1, people initially 'had not learned to take the Robots seriously', whilst one Londoner recalled listening 'fascinated' to the doodlebugs passing over. However, by the end of July 1944, 'the atmosphere of London

[303] The London Branch of the Society - Proceedings (1937): 19

[304] Johnson, L J [Unpublished copy of typed memoir]: 86

[305] Calder, A (1991): 41

[had] changed'[306] as the threat of the V-1 came into focus[307]. The onset of the V-2 bombings later that year resulted in a different experience on the ground. Instead of listening for the distinctive sound of the rocket motor, a larger explosion came with 'no warning ... you are dead before you know anything about it'[308]. This would have been due to the super-sonic speed of the V-2 with its more powerful engine. BIS members dwelling in London and the South East during this time would have been all too aware of these experiences under the shadow of the V weapons, which would certainly have contributed to the new seriousness with which rockets were imagined once the war was over, both within and outside of the Society. Indeed, in later correspondence with Wernher Von Braun, Val Cleaver is said to have been impressed with the V-2's performance during the war, despite the imminent danger it posed[309]. In this context the BIS re-grouped in the autumn of 1945, now with a new Chairman, Eric Burgess, at a time when the physical damage wreaked by the V weapons, including the complete destruction of over 100,000 buildings[310], would have dominated the surroundings of the BIS, which was effectively operated from the lodgings of the prominent BIS members in central London.

As the Society gradually got back on its feet, it started to broaden its horizons once more, and it seems that the internationalist outlook promoted in the 1930s retained a significant role in the post-war period. At a meeting in London in October 1947, Val Cleaver presented a paper entitled 'The Interplanetary Project', in which he outlined the potential costs involved in

[306] All from Hodgson, V (1999): 483 - 495

[307] The V weapons caused the deaths of 8,938 British civilians (6,184 by V1s and 2,754 by V2s) [Charman, T (2009)]

[308] Hodgson, V (1999): 533

[309] Willhite, I P (2001)

[310] Charman, T (2009)

interplanetary travel, whilst also setting out two possibilities for the future of space flight[311]: The first he called 'the utopian view', whereby a post-warfare global society would come together with the advent of new technologies to explore interplanetary space for the good of all mankind. Cleaver's second possibility was that militaristic and nationalistic motives might spur the development of space flight. This dichotomy encouraged the promotion of internationalist discourse, as members of the Society were clearly against the possibility of a militarisation of outer space. BIS members Gordon Thompson and Les Shepherd have suggested that this was the principal reason for the setting up of further links between the space flight societies throughout the world[312], which culminated with the establishment of the International Astronautical Federation (IAF) in 1951. The IAF still thrives today, and the following statement from its website gives a good idea of the founding principles of the IAF and its ongoing importance in the field of space flight research:

> 'In an environment detached from world politics, the IAF has organised an annual International Astronautical Congress that provides a forum for the exchange of experiences and ideas and a cultural link in support of the technology that is opening the Universe to humanity.'[313]

It is important to note that the BIS was 'instrumental' in setting up the IAF in the late-1940s[314]. The idea was first formulated in correspondence between the BIS and three

[311] Cleaver, A V (1948)

[312] Parkinson, B (2008) (ed): 38

[313] International Astronautical Federation (2009) [online]

[314] From Imagination to Reality - An Audio History of the British Interplanetary Society (2008) [multimedia CD]

German astronautical groups which made up the *Gesselschaft für Weltraumforschung*[315] (*GfW*), based in Stuttgart. The *GfW* communicated a resolution in June 1949 calling for;

> 'an international meeting of all societies for rocket development, interplanetary travel and space research, to foster friendly relations and a successful exchange of knowledge and to explore the possibilities of forming an international association for astronautics'[316].

The BIS Council members were 'strongly in favour of the new international federation of astronautical societies'[317], and they took the lead in pushing the idea forwards, using their contacts from space flight societies in France, Argentina, Denmark, Germany, Canada and the USA. Correspondence developed between the *GfW*, the BIS and the *Groupement Astronautique Français*, and as the BIS considered that it would take two years to set up an inaugural meeting, the French society proposed to hold a preliminary meeting in Paris in 1950. This event consisted of a public meeting in the Grand Amphitheatre of the Sorbonne on the 30th September, with an impressive turnout of over one thousand people, whilst a smaller business meeting between the representatives of eight societies took place the next day at the French Aero Club[318], chaired by Val Cleaver, who was at that time Chairman of the BIS. At this business meeting it was decided that the IAF should be formally inaugurated at a 1951 Congress in London, to be organised by the BIS. In the meantime, correspondence would continue between the societies to exchange views and proposals relating to the constitution of the proposed Federation, which would ultimately be based in Baden, Switzerland.

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[315] 'The Society for Space Research'

[316] Shepherd, L R (1994): 478

[317] First International Astronautical Congress, Paris, 1950 (1951): 1

[318] Shepherd, L R (1994): 478

A report of the event in the January 1951 issue of *JBIS* expressed general satisfaction with 'an international conference which had actually *worked*' and that the BIS council members were 'strongly in favour of the new international federation of astronautical societies, providing that the autonomy of the existing national groups was preserved'[319]. This report also states that:

> 'It was not the wish of the BIS, any other European society, or the new federation, to interfere with any reasonable regulations on these matters [of national security]. There was a second category, however, of purely interplanetary research, in which we should hope in future to be able to collaborate on a theoretical basis with the other European societies, and (if they were willing) the Americans also.'[320]

Once more we can see how the idealistic views about space exploration are expressed in opposition to a perceived militarisation of space, and it was deemed that 'for this purpose, some international organisation would be necessary'[321]. It was also reported that the American Rocket Society was not able to attend the Paris Congress in 1950. Although this may have been the result of logistical issues, the question was raised on;

> 'whether the non-participation of the Americans at Paris had been due to a feeling on their part that they were so far ahead of the rest of the world in rocket development that they had little to receive, only to give, from any project for international collaboration'.[322]

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[319] First International Astronautical Congress, Paris, 1950 (1951): 1 [italics in original]

[320] *Ibid.*: 3

[321] *Ibid.*: 4

[322] *Ibid.*: 4

Whilst not wanting to amount such feelings to an explicit expression of anti-Americanism, it appears that the delegates at the Paris Congress were aware of the developments that were beginning to take place in American space flight technology, even though their first serious attempts at space flight would not take place until 1957. This may have also been a factor in the perceived necessity for smaller countries to collaborate in order to keep up with the superpowers, which were also seen as the most likely purveyors of the militarisation of space.

During the Paris Congress, delegates were shown a series of four films[323], two of which were documentaries about rocket testing, at White Sands in America, and at the *Racketenflugplatz* in pre-war Germany. Also shown were the feature films '*Frau im Mond*' (1929) and 'Destination Moon' (1950), which were among the first films to seriously address the possibility of manned flight to the Moon. The former, a melodrama directed by Fritz Lang about a rocket trip to the Moon, is often mentioned as inspiration for the German rocket pioneers. Conversely, Lang was partially inspired by the German rocket expert Hermann Oberth's 1923 book *By Rocket to Interplanetary Space*, and went on to employ Oberth and Willy Ley as scientific advisers to this film, concerned as he was about documentary precision[324]. As such, Oberth and Ley felt that 'any film on space travel by the famous Fritz Lang would do wonders for publicising the movement'[325], and thus the arrangement was seen as mutually beneficial. Indeed, the dramatisation of space flight owes an interesting debt to this film, which included the first documented instance of a backwards 'countdown' to a rocket launch[326]. The other film shown at the Paris congress was 'Destination Moon', an

[323] Premier Congrès International D'Astronautique – Programme (1950)

[324] Eisner, L (1986)

[325] Jensen, P (1969): 80

[326] Eisner, L (1986): 106

Oscar-winning Hollywood production that depicts a space-race theme, in which an American businessman funds an expedition to the Moon in direct competition with the Russians. This latter showing may have added to the feeling amongst delegates that Soviet-American geopolitical competition in space would be something that the IAF would need to counteract, although detailed reports on this aspect of the Congress have yet to be identified.

In a retrospective article several years later, Paris BIS delegate Les Shepherd recounted the process of establishing the IAF. In his view,

> 'the proposed international body was envisaged as being a much more conservative federation of the various national societies, serving largely as a medium for liaison and collaboration [although] many of the representatives hoped that it might eventually become more than this.'[327]

Shepherd's is a realistic account of the role that the IAF should be able to adopt, however, he also hints at a more ambitious view of the future role of the Federation. This possible future was expressed in a 1951 article in *JBIS*, in which the theme of international co-operation in space flight was raised in relation to the United Nations. Founded in 1945, the UN sought to promote international co-operation in a way would have seemed promising to the BIS, and it was deemed the natural home for global projects including the international map of the world, whose administrative Commission was transferred to its headquarters in New York in 1951[328]. In this way, the UN was seen by many BIS members as the most suitable international organisation to co-ordinate the global effort of space exploration:

> 'As evolution can neither be stopped nor kept back, some day the United Nations, a world parliament or some other international institution will take up the problem,

[327] Shepherd, L (1957): 160

[328] Pearson, A *et al.* (2006): 162

> working for peaceful space travel as a common aim of civilisation ... It remains to be seen if the Federation, in any form, can be placed under patronage of the UN.'[329]

This quote, in an article by G Loeser that addresses the roles of the BIS and IAF, suggests that the idea of an internationalist approach to space exploration, as foreseen by the BIS in the 1930s, was undergoing an evolution of sorts, which would pass through the formation of the IAF, and eventually find its home in a more powerful and wide-reaching global organisation, represented here by the United Nations. The implication was that the IAF would act as a stop-gap measure, until such a global organisation could take shape, perhaps once the geopolitical situation had become more stable, and the technology of space flight was well established. It was also suggested that the very nature of space flight research and development meant that international collaboration was the only way forward. Loeser notes that 'hardly any problem exists that involves the cooperation of so many different branches of science and technology as space-travel', and that, for this reason, space flight 'can only be attained by loyal and unselfish international collaboration'[330]. Thus, there are a range of ideological, economic and practical reasons that were put forward by the BIS in this period to encourage scientific internationalism for the development of space flight.

Some of the ideas about various aspects of British outer space were to be found in works of science fiction written by BIS members including Arthur C Clarke, and in later chapters I shall go into greater detail about the nature of such fictional representations and their significance. However, for the purposes of this chapter it is possible to treat certain specific extracts from Clarke's early fictional writing as indicative of how he thought some of the grounded aspects of the British interplanetary project would develop in an idealistic scenario.

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[329] Loeser, G (1951)

[330] *Ibid.*: 146

Indeed, Clarke's early work in general was characterised by narratives of optimistic scientific propaganda[331] that typically involve near-future scenarios whereby space flight has become a reality. In his first published novel, *Prelude to Space* (1953), Clarke outlines what essentially amounts to a terrestrial manifesto for interplanetary flight based on his experiences and expectations in the space flight community that he was a part of in the late-1940s and early-1950s. One dedication read: 'To my friends in the BIS – who by sharing this dream, helped to make it come true'[332], whilst another edition was dedicated 'to Val [Cleaver] and Wernher [Von Braun] – who are doing the things I merely write about'[333]. Specifically, there are two sections from this novel that project the development of British outer space forwards in interesting ways. The latter half of the narrative is set in and around a rocket range in Australia, and this is a setting that I shall return to later in this chapter. The first half, however, places London at the administrative centre of an international space flight community, in much the same way that the BIS and the IAF were developing in the early-1950s.

The narrative to *Prelude to Space* is set in the 1970s, and sees the main character, a historian by the name of Dirk Alexson, travelling to London from America to record the anticipated first manned space flight. That the protagonist arrives in London to document the early stages of space flight highlights Clarke's belief at the time that Britain would be at the forefront of an international space flight community. Furthermore, the project to send the first men into outer space and onwards to the Moon is based at an organisation called 'Interplanetary'. Clarke locates this institution at a fictional version of London's South Bank, which was a site of significant architectural change around the time the novel was written. Clarke was living in

[331] Nicholls, P (1981)**:** 121

[332] McAleer, N (1992): 70

[333] Clarke, A C (1953b): 5

London at this time, and would have been aware of this change, as well as the more general opportunities for architectural renewal in London, in the spaces cleared by wartime bombing. The reader is introduced to one of the members of Interplanetary, who describes its origin:

> '[Interplanetary] was realised by an oddly assorted group of scientists, writers, astronomers, editors and business men in the old Interplanetary Society. With very small capital, they started the publication *Spacewards* ... those who subscribed to it felt that they were helping to finance the first space-flight.'[334]

Clarke was Chairman of the BIS in London from 1946-47, and from 1951-53, and these descriptions of the fictional Interplanetary are a clear allusion to the real-life BIS. Indeed, he later admitted that he had 'propagandistic ideas in mind'[335] when planning this book, and it seems that Clarke here was fantasising about how the BIS would grow out of its 'oddly assorted group' into a multinational corporation that would have the popularity and resources to co-ordinate humanity's first steps into outer space. The origins of the BIS are also reflected in the background of the leading members of Interplanetary. Whilst pre-war BIS members, including Clarke, were known to have contributed to the early science fiction pulp magazines, as recounted in Chapter 6, Clarke's 'Professor Maxton', one of the leading figures in Interplanetary, is said to have written for 'that lurid magazine - *Stupendous Stories*'. These connections were not seen by Clarke as co-incidental; on the contrary, he believed that science fiction had an important influence on the development of interplanetary science. Hinting at this connection, Professor Maxton urges the protagonist to write;

[334] *Ibid.*: 23

[335] McAleer, N (1992): 70

> ‘a learned thesis on “Scientific Romances, and their Effects on the Development of Astronautics”’[336]

By establishing these clear analogies between the BIS and the fictional Interplanetary, it is possible to examine in detail what Clarke thought were the most important and enduring characteristics of his idealised interplanetary society, which draw from ideas of Britishness and scientific internationalism. Clarke describes Interplanetary as:

> ‘a typically British compromise ... It’s as international as the United Nations secretariat, though the British certainly provide most of the driving force’[337]

As we can see, there is a sense that Clarke’s conception of an interplanetary organisation can be at the same time British and international. It seems likely that the British aspect was as much to do with Clarke’s personal surroundings and his position as Chairman of the BIS, than any desire to promote British space flight for the sake of his country. Moreover, the internationalist aspect perhaps was borne out of both a practical realisation that the endeavour of space exploration would take an international effort, aligned with a more idealistic concept that, once outside the confines of the Earth’s atmosphere, national boundaries would seem less important.

This theme of outer space being presented as a kind of modern global commons was reflected in the deliberations of the BIS in 1951, when the debate about the name of the Society cropped up once more in the *Journal*. It was proposed by one member that the word ‘British’ be omitted from the title of the Society, and in a subsequent article it was revealed that, following a postal ballot, about 85 per cent of those writing in were in favour of the proposed change, some of the reasons supporting it as follows:

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[336] Both from Clarke, A C (1953b): 137

[337] *Ibid.*: 18

> 'It is the simplest title; the word 'British' is incongruous in such a context; a large proportion (one-sixth) of our membership is not British and the adjective may act as a deterrent to foreign members'[338]

Following this, the BIS held a meeting at their headquarters, in which 90 per cent of the attendees voted *against* the resolution to change the name. There are a number of possibilities regarding this disparity in voting patterns, and the resultant decision not to change the name from 'BIS' to 'IS'. One could be that international members of the BIS were in favour of the change, and, whereas they may have sent their ballot by post, would not have been able to attend a London meeting in person. Conversely, it may have been that the core of the Society, who, based in and around London, would have been more able to attend a vote, would more likely have been in favour of retaining the prefix 'British'. In any case, the reasons put forward for suggesting the name change generally came from an internationalist stance, and in the *JBIS* article, a balanced rationale was put forward for maintaining the name 'BIS':

> 'It is desirable for an association such as ours to have the name of its headquarters' country in its title – however internationally-minded it may be.
>
> We hope that 'The Interplanetary Society', in fact if not in name, may soon come into existence, being the world-wide complex of all societies working towards our common goal.'[339]

It therefore seems that the divisions in the Society that could be inferred from this episode were not, in fact, so prevalent: The membership does seem to be united in favour of an

[338] BIS or IS? (1951): 193

[339] *Ibid.*: 193 - 194

internationalist outlook for the BIS at this time, and this was expressed in an arguably superficial debate around the naming of the Society.

The year between the Paris and London Congresses was a busy one for the BIS, whose task it was to organise the Second Congress, whilst also co-ordinate the formative policy documents. In May 1951, 'the BIS was able to circulate a full draft Constitution for the IAF, describing the proposals received from other societies and attempting a compromise between them'[340]. When this document was discussed at the London Congress, it was generally met with acceptance, with the one sticking point being the relative voting power to be given to different societies on the IAF Council. The eventual compromise was to adopt the system of 'one society, one vote', despite the fact that the British and American societies boasted far greater membership numbers than the smaller ones[341]. This was in accordance with the generally agreed principle that 'the BIS and the other larger societies could, and should, help the newer and smaller groups to establish themselves'[342]. Having co-ordinated the founding principles of the IAF in the first part of 1951, the BIS presided over the London Congress from Monday 3rd September until Saturday 8th September that year. The Congress consisted of four days of working sessions, alongside social occasions and a public meeting, with press attendance throughout.

The working sessions consisted of papers being delivered at Caxton Hall in Westminster, in English, French and German (with translated summaries), centred on the theme of 'The Earth-Satellite Vehicle'. Some titles included 'Interplanetary Travel between Satellite Orbits' by Professor L Spitzer (BIS), read by Val Cleaver (BIS); and 'The Optimum Satellite Freight

[340] Second International Astronautical Congress, London, 1951 (1951): 318

[341] The following membership numbers were published for societies from – Argentina: 22; Austria: 50; France: 210; Germany: 586; Italy: 35; Spain: 80, Sweden: 60; Switzerland: 15; UK: 1,409; USA: 1,956, in the *Journal of the British Interplanetary Society,* **10**(6): 322

[342] First International Astronautical Congress, Paris, 1950 (1951): 1

Rocket' by Ing. H Hoeppner (*GfW*). The type of research being presented here displays an interesting conceptual unity, all dealing with a realistic approach to the most readily achievable goal of space flight, which was correctly foreseen as the establishment of an artificial satellite. This was 'reflected in the agreement shown between all the lecturers that it represents the first and essential task in the conquest of space'[343]. Indeed, it was the general opinion of the delegates that the first satellite station could be established 'within the next 20 years'[344]. This was actually a very conservative prediction, seeing that the first satellite launch would take place just six years later, and is all the more surprising when considering the detailed and technical nature of some of the presentations, which, although containing a certain amount of conjecture, were at the forefront of space flight research at this time. The delegates' estimates may have been based on the premise of a collaborative international effort to attain space flight, and they were evidently not aware of the rapid progress that a dedicated national programme by either one of the superpowers would make. On the contrary, Hermann Oberth, who would somewhat ironically go on to work on the American Apollo project, noted in an interview that 'these problems are too great to be solved by one nation alone'[345]. One other area of outer space research that was being carried out at this time in Britain was radio astronomy, a new science that was beginning to explore the universe in a completely different manner, through radio telescopes at Jodrell Bank and Cambridge from the late-1940s. The absence of this type of research at the Congress is a further reflection of the aims of the BIS and IAF at this time, which were to physically explore outer space by means of space flight, as opposed to the ground-based forms of space

[343] Second International Astronautical Congress, London, 1951 (1951): 326

[344] Interplanetary Flight - Hopes of Setting Up Satellite Station (1951): 2 [Interview with Les Shepherd]

[345] Research for Space Flight (1951): 2

exploration that were also beginning to emerge. This would also have been a reflection of the fairly limited status of radio astronomy on the international scale of space research.

Images from the German 'Society for Space Research' brochure of the 1951 International Astronautical Congress (IAC) demonstrate pictorially the key elements of the event in an interesting manner, and are reproduced in Figure 19 and Figure 20 below. The first shows us a series of national flags in space alongside the Earth. With the European hemisphere prominent, a British flag is seemingly thrust into the blankness of outer space from a point in Northern Europe, from which, in turn, emanates a group of national flags, overlaid by a Picasso 'peace dove'. Another montage from the last page is similar, but more peculiar, comprising a photomontage of the heads of the major characters in European astronautics, including Eugene Sanger, Hermann Oberth and Wernher Von Braun, being led towards the Moon under a giant hat belonging to 'London' by Val Cleaver sitting at a desk. Two characters seem to be rejected by the Moon/Face, one of whom appears to be carrying an American flag, and could be identified as the then US President Harry Truman, who was often pictured wearing a Panama hat similar to the one depicted here. The other caricature, sitting astride a rocket, is likely to be Robert Goddard, the lone American rocket pioneer. The symbolic message implied by these two montages is that joint European co-operation, with British leadership, is the favoured means by which humankind should peacefully explore outer space, as opposed to unilateral American, or individualistic, progress towards this goal. The prominence of Britain reflects London's status as the host city of the 1951 IAC, but this in turn is a result of the instrumental role that the British organisers played in setting the agenda for the first few years of the IAF. The images also reveal that, despite the focus of the IAC lecture programme on the establishment of an artificial satellite, the ultimate agenda of the IAF would have been a lunar mission, whilst the presence of rockets in both images highlights the enduring importance of this piece of technology to the space flight endeavour.

Figure 19 - Cover of Society for Space Research pamphlet of the 1951 IAC

Source: IAF box file, *BIS Archive*

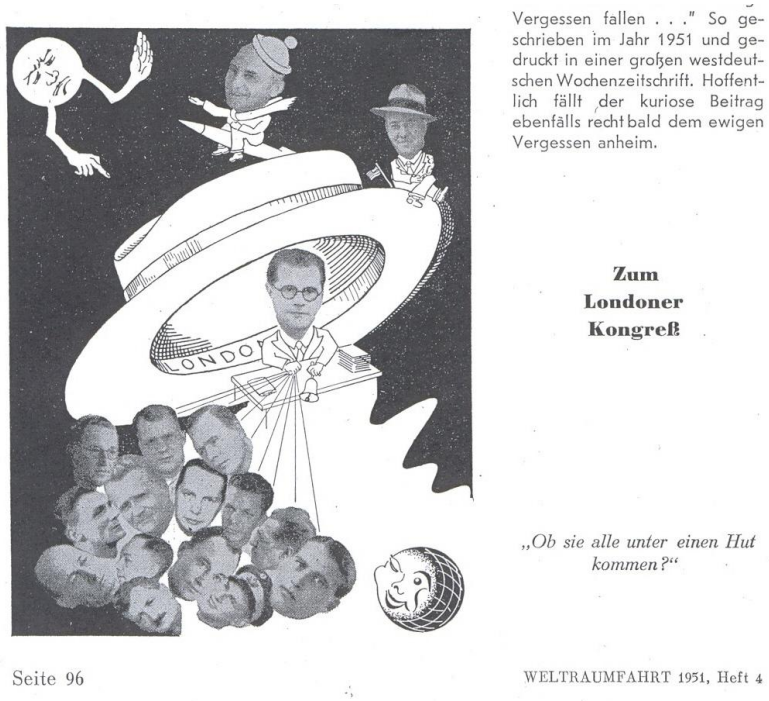

Figure 20 - Last page of Society for Space Research pamphlet of the 1951 IAC, with photomontage. The captions translate as:

'The London Congress'

'Will they all come under one hat?'

Source: IAF box file, *BIS Archive*

The social interactions in and around the London Congress were said to have 'played a pleasant and important part in helping to forge international bonds of goodwill between the various delegates'[346], and these were arguably of equal importance to the formal research programme. These events included the standard welcome reception and conference dinner, various impromptu gatherings, and also, on the Wednesday, which was kept free from formal events, 'the BIS presented all delegates with tickets to the South Bank (Festival of Britain) exhibition, and several BIS Council Members accompanied them on a visit there'[347]. This exhibition had been opened at the start of the summer of 1951, and Congress delegates would no doubt have gravitated towards the rocket-like Skylon tower and the Dome of Discovery with its Outer Space exhibit. The visitors may also have reflected on the prominence of science in the exhibit's vision of how to build a better Britain. In the Dome of Discovery, 'the body and outer space were constituted as the appropriate frontiers for discovery, rather than foreign lands'[348], and this type of representation may have encouraged the IAF delegates to see themselves as the new explorers of a modern age. Other informal events which took place at the London Congress included a 'trade preview' of the science fiction film 'The Day the Earth Stood Still', which was said to 'have an interplanetary theme'[349]. This continued a trend started at the Paris Congress, and highlights the significant overlap that existed between scientific research and the diversions (inspirational or otherwise) of science fiction films.

As such, the annual Congress represented the primary activity of the IAF, a gathering which would continue at locations in central Europe, with Stuttgart in 1952, Zurich in 1953, and

[346] Second International Astronautical Congress, London, 1951 (1951): 326

[347] *Ibid.*: 326

[348] Conekin, B (2003): 57

[349] Second International Astronautical Congress, London, 1951 (1951): 326 [This feature film dealt with the subject of alien invasion]

Innsbruck in 1954. Later on came the publication of the Federation's Journal, *Astronautica Acta,* first published in 1955, containing papers delivered at the fifth IAC and announced by the BIS as 'a vital part of the literature of space flight'[350]. Regardless of this, the establishment of the IAF in the early-1950s, including its two opening Congresses are important events to consider in relation to the ways in which the BIS presented space flight research in the early post-war period. The prominence of the BIS in this process highlights the leading role that this British society took in the early developments of space flight technology, and the internationalist outlook here is elided with a form of radical Britishness that sought to move away from the traditional domestic establishment that was the perceived home of scientific societies at this time.

The early-1950s also represent a high watermark for the idealistic view of space flight that such activities were supporting, and pre-date the emergence of a more general coalescence of scientific internationalism in the mid-to late-1950s[351]. This moment of scientific and international optimism has since been indicated as an idealistic climax that preceded a decline in the potency of such ideals, against the backdrop of increasing global tension surrounding the escalation of the Cold War in the penultimate decades of the twentieth century. As we shall see in the following section, this is a pattern that could arguably be applied to the decline of the idea of an international British outer space, which certainly reached a peak in the early- to mid-1950s and started to unravel in interesting ways as we move into the 1960s.

[350] Astronautica Acta (1955): 267

[351] See special issue of *Journal of Historical Geography* on the IGY (2008) **34**(4), and Krige, J (2006)

European and Commonwealth approaches to British outer space

Towards the end of the 1950s and into the 1960s, the BIS increasingly encountered prohibitive factors with regard to British and European space flight research, which was made all the more frustrating as the superpowers started to advance their space programmes from the late-1950s, culminating in the lunar landings of the late-1960s and early-1970s. It was during this period that the BIS began to establish more realistic proposals for how British space flight could be achieved. Instead of advancing conceptual plans, such as the pre-war 'BIS Moonship' and a post-war design for an artificial satellite, the BIS started to promote international organisations that would take the lead in bringing such plans to fruition. Whereas the establishment of the IAF demonstrated a certain amount of idealism and international goodwill, the Federation did not actually have the power or funding to conduct serious, practical research into space flight, serving as more of a hub for the various astronautical societies to congregate around. Furthermore, the BIS came to realise that the British government was not willing to instigate an independent national space programme, having 'neither the practical will nor the resources to become involved in a space race'[352]. So, enrolling the spirit of scientific internationalism that was abundant among the space flight societies, the BIS from the mid-1950s chose to promote government-level collaboration between Commonwealth nations as the desired means of achieving the goal of space flight. This shift not only came about because of the need to share the costs involved in a space programme, but also because of the perceived geographical advantages held by the Commonwealth as a whole. One BIS article from 1961 highlighted these advantages:

> 'The British Commonwealth has one asset for a space programme possessed by no other single community in the world: its scatter. Moreover, member nations control

[352] From Imagination to Reality - An Audio History of the British Interplanetary Society (2008) [multimedia CD]

> territories at nearly every latitude between 50° south and the North Pole, with an area of Antarctica thrown in for good measure ... The top of Mount Kenya ... seems to be the ideal launching site for interplanetary probes and other difficult launchings.'[353]

Setting aside the difficulties associated with building a launch site on the top of a mountain, here the author, E D G Andrews, enrols the Commonwealth from pole-to-pole for the benefit of the BIS, connecting the past exploits of British imperial explorers to the perceived future exploration of interplanetary space. Here, the extremities of the Commonwealth are seen as distinct advantages, including the conception that equatorial regions, which are subject to greater centrifugal forces from the earth's rotation, make launching a satellite into earth orbit easier than at higher latitudes. The fact that Mount Kenya is situated almost exactly on the Equator, providing the maximum 'latitudinal boost', suggests that Andrews may well have had this in mind when writing his article, alongside a further notion that a mountain top would provide greater proximity to outer space. The invocation of this particular mountain also brings to mind the exploits of the British explorer and geographer Halford Mackinder, who completed the 'first ascent' of Mount Kenya in 1899, compounding the incorporation of mountaineering into the rhetoric of imperial exploration and adventure[354]. Furthermore, and as we shall see later, isolation also becomes a distinct asset when considering the location for a rocket launching site, as a substantial ranging area is needed to safely receive and recover test rockets, and this is another aspect that the Commonwealth's 'scatter' was intended to provide.

[353] Andrews, E D G (1961): 59

[354] Ryan, J (1999)

One of the most vocal proponents for the Commonwealth space project was G V E Thompson, who served on the BIS Council almost continuously from 1946 to 1994. He was also editor of *JBIS* from April 1957 to December 1965, a position which enabled him to publicise his own views on the matter of British outer space in a series of editorial pieces at the height of the 'space race'. Thompson declared on behalf of the Society that 'the British Commonwealth should launch satellites and undertake space research', whilst acknowledging that such attempts 'must not be mere imitations of American and Russian feats'[355]. With this in mind, the BIS organised a Commonwealth Spaceflight Symposium in London in August 1959. Papers included one proposal by the South African Interplanetary Society involving 'the use of Antarctic territory as the Commonwealth satellite launching site for a pole-to-pole orbit'[356]. In this manner, collaboration between the UK and Commonwealth countries would act as 'a first step to active co-operation in astronautics', which would lead the way for 'the ultimate objective of making astronautics a truly world enterprise'[357]. This progressive sense of a globally-connected outer space project was presented against a background of historic British achievement in global exploration:

> 'Surely it is unthinkable that Britons will not participate in this new exploration, or are the New Elizabethans much inferior to the old? Drake, Raleigh, Hudson, Cook, Park, Franklin, Eyre, Burke and Wills, Burton, Baker, Speke, Grant, Darwin, Livingstone, Stanley, Shackleton and Scott – do these names mean nothing anymore? Are Hunt and Hillary to be the last of the line?'[358]

[355] Thompson, G V E (1959): 41

[356] Gatland, K W G (1959): 37

[357] *Ibid.*: 35-36

[358] Thompson, G V E (1959a): 158

Thompson's impressive list of pioneers starts with the sixteenth century 'old Elizabethans' of Drake and Raleigh, and continues in a roughly chronological manner through explorers of Africa and Australia to the Antarctic explorers of the early-twentieth century, and the more recent conquerors of Mount Everest, 'Hunt and Hillary'. The 'New Elizabethans' of the 1950s are exhorted to match up to the old, in a continuation of this lineage through the conquest of space. The 1953 ascent of Everest has been discussed by Peter Hansen[359], who highlights the expedition's carefully managed public relations, noting how news of the ascent was delayed to coincide with the coronation of Queen Elizabeth II on June 2nd that year. In this way, modern conceptions of exploration, Commonwealth and technology (which was integral to the display of the coronation[360]) are interlinked in a way that characterises the small but significant cultural movement of New Elizabethanism. These are traits that are called upon by Thompson in the passage above, through the expectation of interplanetary exploration, the enrolment of the Commonwealth and the technology of space flight. Furthermore, Hansen notes how a distinctly British heritage is counterpoised with a sense of internationalism surrounding the representation of the Everest ascent. It is noted that 'along with the nationalism of the Union Jack, Col. Hunt wrapped himself in the flag of the UN, symbol of a new internationalism'[361], whilst an expansive definition of Britishness including the Commonwealth was employed to characterise the expedition as British, even though Hillary was a New Zealander and his companion Tenzing Norgay a Nepalese Sherpa, with Hunt, the organiser of the trip, staying at base camp. Hansen's analysis could provide a way into considering the British Commonwealth space project, which aimed to use Commonwealth

[359] Hansen, P (2001)

[360] Weight, R (2002): 234

[361] Hansen, P (2001): 62

resources in the name of British exploration, but packaged this approach with the language of internationalist aspirations.

There is also a progression in Thompson's 'line' from oceanic voyages, through land-based continental excursions, and finally the ascent of the world's highest mountain, perhaps suggesting a natural evolutionary movement from sea, to land, to high altitude, and then onwards to outer space, an idea expressed more explicitly in some of the writings of Arthur C Clarke (see Chapter 7), and indeed more directly in the previous quote by E D G Andrews on the potential of mountain-top launching sites in the Commonwealth. However, the implied legacy of the reign of Elizabeth I is more obviously called upon by Thompson in his invocation of two iconic explorers, 'Drake and Raleigh', which is a recurring motif of New Elizabethanism. Whilst both were knighted by Elizabeth I, Drake became famous for being the first Englishman to circumnavigate the world, which was a feat that was expected to be mirrored by the orbital flight of a satellite in the space age. The extent of this historicising trend can be exemplified by referring once again to the writings of Clarke, whose *Prelude to Space* contains references to New, and, indeed, 'Old' Elizabethans. In this way, Clarke describes an interplanetary scientist character as 'one of the pioneering explorers of the Second Elizabethan age'[362], whilst describing on the fictional banks of the Thames:

> 'the *Discovery*, which took Captain Scott into the Antarctic back at the beginning of this century ... the sense of historical continuity was very strong. The line that stretched back to Drake and Raleigh and yet earlier voyagers was still unbroken: only the scale of things had changed.'[363]

[362] Clarke, A C (1953b): 50

[363] *Ibid.*: 11

Although written some years before Thompson's genealogy of British explorers in *JBIS*, Clarke demonstrates a remarkable consistency with his fellow BIS member in his invocation of an Elizabethan lineage, represented by Drake and Raleigh, whose ideals are also evoked by the vessel of Scott of the Antarctic. This type of historical invocation is quite a turnaround from the previous inspirational ideas that BIS members typically called upon to ignite interest and motivation in the subject of space exploration. Whereas up to the early-1950s, inspiration generally came from utopian ideas of human space flight, later years saw a realisation of the economic and resource-based difficulties involved in such an enterprise. To this effect, proponents of British outer space found themselves calling upon a different set of ideals, trading on the past glories of British territorial expansion, linked in with a conception of the modern Commonwealth of Nations, which would be able to provide the resources and financial clout needed to launch a space programme.

The jewel in the crown of the proposed British Commonwealth space project was the Woomera rocket range in Australia. Described as 'a most impressive asset to Commonwealth research'[364] and 'the leading rocket ground of the British Commonwealth'[365], the desert facility was initially used as a weapons testing ground by the British government in the late-1940s. The advantage of this site was that it lay 'across empty wilderness to the shores of the Indian Ocean, but it could ultimately be extended over the sea to give a total length of 2,700 miles'[366]. This set of conditions allowing the test firing and recovery of rockets could not be matched in the home territory of Britain, although some smaller testing sites were established at places including Highdown on the Isle of Wight, and Uist in the Outer Hebrides, some of which involved only static testing. Other potential testing sites mentioned

[364] Cleaver, A V (1957): 106

[365] *Ibid.:* 103

[366] Carter, L J (1950): 1

in *JBIS* across the Commonwealth included one in Canada, but this was deemed unsuitable because of the problem of deep snow in winter. In this way, Woomera essentially came to represent the concept of the British Commonwealth in BIS publications, and due to its location on the other side of the planet from Britain, the enrolment of Woomera in space research discourse added a global dimension to the British space project. As it turned out, the geographical advantages of Woomera for a launch pad to space were never fully put to use, the pinnacle of its achievements being the successful testing of the Blue Streak rocket in the mid-1960s[367]. However, the imaginative landscape of 'Spaceport Woomera' captured the attention of science fiction writers in the 1950s, as 'a remote and exotic location where intrigue, adventure and the inspiration of space exploration might be found'[368]. Here we can once again turn to Clarke's *Prelude to Space*, the latter part of which is set in the Australian desert, and draws on New Elizabethanist and Commonwealth discourses. Clarke's setting for the first anticipated space launch clearly extrapolates a vision of Woomera as a launch pad into space:

> 'Luna City was built by the British government around 1950 as a rocket research base. Originally it had an aborigine name - something to do with spears or arrows'[369]

Indeed, the name Woomera is derived from an aboriginal word for a spear-throwing device[370], which was pertinent given its modern association with a more powerful projectile, the rocket. That Clarke chose to replace the indigenous name with the futuristic-sounding

[367] As recounted in Chapter 2, the Blue Streak was initially developed to deliver Britain's H-bomb. In 1960, however, this programme was cancelled, allowing the rocket to be converted into a satellite launcher.

[368] Dougherty, K (2008)

[369] Clarke, A C (1953b): 104

[370] Southall, I (1965)

'Luna City' does little to hide the fact that this setting is clearly based on Clarke's perception of Woomera, which would have been partly derived from published reports, as well as through more speculative articles and discussions at the BIS. Commonwealth narratives are played out implicitly within Clarke's Luna City, placing British icons such as the Union Jack and a letter from 10 Downing Street in the heart of the Australian desert. Moreover, in the final pages of the novel, the sound of Big Ben chiming out through loudspeakers is described as the space ship 'Prometheus' is finally launched. These portrayals of 'Britishness', whilst rather obvious, are nonetheless interesting in that they advance this conception of an interplanetary project that is at the same time British and international, towards a framework that exploits the British Commonwealth as the backdrop for interplanetary scientific internationalism.

By the 1960s, the calls by the BIS for a British presence in outer space were becoming more urgent in tone, one *Spaceflight* article stating that 'A British entry into space activities ... has now become essential if we are to maintain our position in world technology'[371]. These statements coincided with a list of recommendations submitted by the BIS to the Prime Minister, Harold Macmillan, and the Minister for Science, Viscount Hailsham, in 1960. Here, alongside the promotion of a 'Commonwealth enterprise', the BIS raises the idea of co-operating with other European countries, claiming that 'Europe would be able to compete on equal terms with the USA and USSR'[372], whilst another article highlights 'a number of such co-operative [European] projects in nuclear science and engineering'[373], which could form a model for European collaboration on space flight. This form of multilateral cooperation would eventually lead to the formation of two organisations in 1964 – the European

[371] Shaping the Space Programme (1960): 239

[372] *Ibid.*: 244

[373] Participation of the UK in Space Flight Development – European Collaboration (1960): 237

Launcher Development Organisation (ELDO), said to have been 'entirely a British idea'[374] funded primarily by the UK[375], and the European Space Research Organisation (ESRO). The role of ELDO was to develop a European satellite launcher, using the defunct Blue Streak rocket, along with components from other European countries, to be tested at Woomera. ESRO was intended to conduct more general research into outer space and the upper atmosphere, and the two organisations merged in 1975 to form the European Space Agency. The BIS continued to support European collaboration throughout the 1960s, with another set of government recommendations submitted in 1965, calling for the UK to 'actively support the development of an integrated Western European Space Programme ... [which] will eventually make collaborative European-US projects desirable and advantageous'[376]. The acceptance that a move towards Europe would be beneficial for a British space programme reflected a more general trend in the 1960s of European co-operation that surrounded the formation of the European Community, even though Britain's application to join the EC was vetoed in 1963. Furthermore, the specification of co-operation between 'Western European' nations and the United States highlights the perceived sense of balance in Europe that was needed against the Soviet bloc to the East, which was, at the height of the Cold War, seen as a malignant political influence. Apart from such geopolitical concerns, BIS members in the 1960s expressed a certain satisfaction with British contributions to ELDO and ESRO, but ultimately believed that Britain should be doing more:

[374] From Imagination to Reality - An Audio History of the British Interplanetary Society (2008) [multimedia CD]

[375] ELDO was funded by the UK (£27m), France (£17m), Germany (£15.5m), Italy (£7m), Belgium (£2m), the Netherlands (£2m), and Australia providing the rocket range and supporting facilities. These figures were published in *Spaceflight* (1963) **5**(1): 8

[376] Recommendations by the Council of the BIS to HM Government (1965): 111

> 'Slowly, almost imperceptibly, Britain is becoming involved in astronautics. Our aims are not coextensive with ELDO's but far more extensive than those of ELDO and ESRO put together ... Co-operation plus independent action equals maximum progress.'[377]

However, towards the end of the 1960s, 'the production of a satellite launcher system became mired in European politics'[378], and the European programmes became seen as 'confused, unplanned and ineffectual'[379] by the BIS. The launching site for the ELDO project was moved in 1966 from Woomera to Kourou in French Guiana, and one successful satellite launch was achieved in 1971. However, the project was seen both as a political and a technical failure, and funding was cancelled in the run-up to the final launches in 1971 in a move which meant that all further work on British rocketry was effectively stopped[380]. During this period, the BIS came to accept the fact that a more limited involvement in outer space was what was left for Britain, despite the substantial weight of optimism and international goodwill that had characterised what Arthur C Clarke called 'the heroic period of the space age [that] lay between 1935 and 1955'[381]. This was the situation as the 1970s approached, and, by this time, global interest in space exploration was decreasing, after the phenomenally expensive Apollo missions, and the deceleration of events in the 'space race', the end of which was symbolised by the first joint US-Soviet space mission in 1975.

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[377] Thompson, G V E (1962): 317 - 318

[378] From Imagination to Reality - An Audio History of the British Interplanetary Society (2008) [multimedia CD]

[379] A Space Policy for Britain (1968): 56

[380] Hill, C N (2001): 14

[381] Clarke, A C (1966): 167

Chapter 6

Popularising the Science of British Outer Space

During the first few years of its existence, the principal way in which the British Interplanetary Society publicised itself was through active engagement with the printed media. This was a concerted strategy that was necessary in order to uphold one of the founding principles of the Society, 'the stimulation of public interest in the subject of interplanetary travel'[382]. This was not only seen as a worthy goal in its own right, but would also facilitate the growth of the BIS through increasing membership. The resultant media engagement principally occurred in the Liverpool era through local news outlets, but spread to national publications such as *Chambers's Journal* and the *Daily Express*. Alongside these more mainstream publications came an association with specialist magazines. In this way, one strategy of the BIS was to insert stories about itself and about outer space more generally, into nationally-distributed publications. This led the BIS to associate itself with recognisable public figures, embodied in the pre-war period by Professor A M Low, and continued in the post-war period with Patrick Moore. These associations and their development shall be the focus of this chapter, which will be dealt with in a roughly chronological manner, starting with the 'popular science' of the 1930s, through the appointment of A M Low as President of the BIS, and, in the post-war period, through the involvement of Patrick Moore in the publication of the BIS popular magazine *Spaceflight*, and the television programme *The Sky at Night*. I will argue that, whereas in the pre-war period, publicising British outer space was necessary to uphold the values of the nascent BIS; after the war, a more complex set of associations developed which broadened the scope of the culture of British outer space, and incorporated new forms of representation and performance.

[382] Cleator, P E (1934c): 3 – 4

Popular science and the role of the amateur in the pre-war period

The founder of the BIS, Philip Cleator, had, by the early-1930s, developed a personal passion for the idea of interplanetary flight. He had also by this time established a productive relationship with *Chambers's Journal*, which was one of the means by which he was able to publicise his enthusiasm for this subject. In a memoir published in *JBIS* in 1986, Cleator recalls how he 'penned an article on the interplanetary idea and its possibilities' for the journal, which he describes as 'a highly respected and scientifically inclined monthly magazine'[383]. This periodical was established by the Scottish publisher and politician William Chambers in Edinburgh in 1832, and went on producing on a commercial scale a combination of 'wholesome' instalment fiction and other instructive and entertainment matter until 1956[384]. This was the type of publication Cleator was naturally drawn towards, as opposed to scientific journals connected to universities and other forms of authority, which Cleator railed against throughout his life. For Cleator, a popular magazine was not incongruous with quality scientific output, and this was reflected in the publication strategy of the BIS throughout its existence.

In his article[385], Cleator explains with plain but incisive language, the rocketry experiments conducted by Robert Goddard in America, and goes on to describe some of the difficulties of interplanetary travel, including an explanation of gravity, differences in temperature, and the dangers of meteors. The middle ground that Cleator occupied in his writing style between rigorous scientific detail, and language and content simple enough to stimulate and retain general interest (e.g. 'the ship will require windows'[386]), was a key element to the successful

[383] Cleator, P E (1986): 147

[384] Law, G (2002)**:** 22

[385] Cleator, P E (1933)

[386] *Ibid.*: 50

strategy of the BIS before the war. This became more of a balancing act once the mainstream press got hold of the article, after which Cleator was 'besieged by hordes of reporters, intent upon informing their readers of the imminence of trans-world rocket flight'[387]. Here, Cleator displays an understanding of the dangers of exaggerated press reporting, particularly when concerned with unusual ideas such as interplanetary exploration. He wrote a short response piece in *JBIS*[388], attempting to counter the sensationalism, whilst acknowledging the value of publicity in the operations of the BIS, which was struggling for new members in its first few years of existence.

Although early members got to know about the BIS through personal friendships and the local Liverpool press, the Society had ambitions to grow into a nationwide organisation, an aspiration which would require wider publicity. One of the ways in which the BIS sought to gain national exposure to this effect was through advertising itself in specialist magazines, ranging in content from hobby engineering to science fiction. One such periodical in the former category was *Practical Mechanics*, from the publisher George Newnes Ltd, previously known for publishing *The Strand Magazine*, which contained the early stories of Sherlock Holmes. This publication was established in 1933, and continued up until 1963, providing articles, instructions and blueprints for people who wanted to build their own versions of mechanical objects such as wireless radios, model aeroplanes, and even a Geiger counter.

[387] Cleator, P E (1986): 147

[388] Cleator, P E (1934d): 20

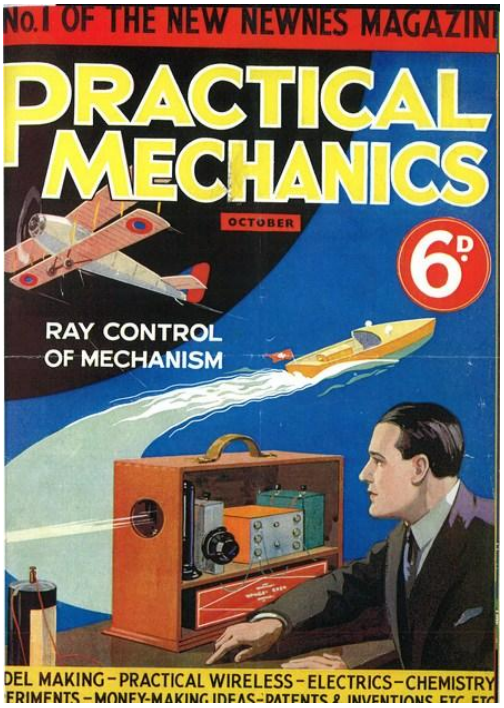


Figure 21 - *Practical Mechanics* **1**(1)

[Oct 1933]

Figure 21 shows the front cover of the first issue of *Practical Mechanics*, in which a bright primary colour set and bold typeface are used to make the issue stand out amongst other magazines, as well as to highlight some of the features that the reader would expect to find inside. The image portrays a biplane and a driver-less motor boat, their implied movement seemingly controlled by a box sitting on a desk, as suggested by the intriguing phrase 'ray control of mechanism'. A figure is sitting down in a casual posture, dressed in a suit, in front of the device. This alludes to the identity of the type of reader that the publisher was aiming at; an amateur whose interest in 'mechanics' would be taken up as a leisure activity, as opposed to an image of a scientist in a white coat or overalls. The editor, F J Camm, outlined the philosophy behind the publication in the first issue:

> '[In] the remarkable mechanical and scientific age in which we live ... the occupants of the remotest dwellings now think and talk in technical terms in their everyday conversation.

> The wonder of today is the commonplace of tomorrow. This interesting age invites this new publication, which arrives when all the old orders of thought are changing.'[389]

This vision of a technically-advancing, modern society was an ideology with which the BIS would have wanted to associate themselves. In particular the conception that 'old orders of thought are changing' would have felt supportive at a time when the idea of space flight was seen as impractical or even ludicrous in journalistic, academic and political circles. Alongside this expansive vision, Camm clearly delineates the form of his new magazine, which sought to reflect its function as a publication for amateur engineers:

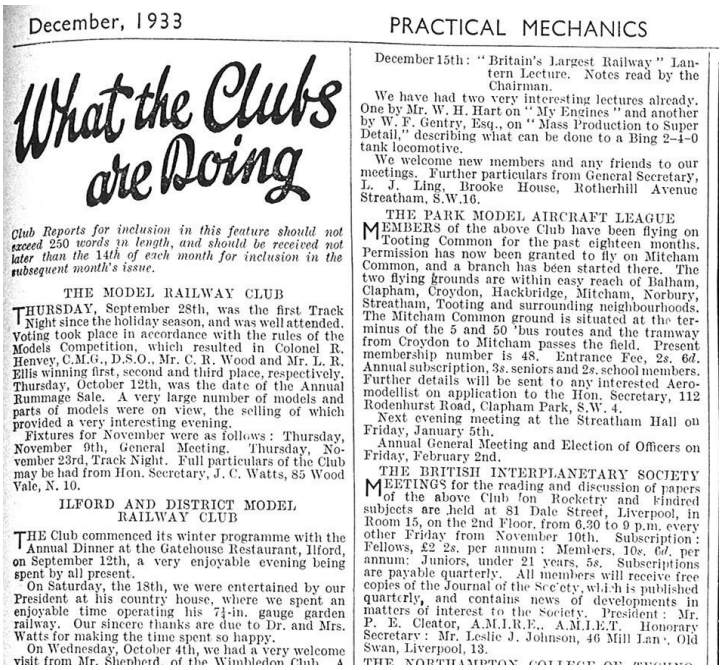
> 'Every article will be written in everyday language from which highly technical phraseology has been vigorously excluded ... Technical diagrams will be avoided whenever possible ... A modern style of illustration in both line and half-tone will be introduced.'[390]

The importance of language and clear illustration is explained here, which would match the magazine's aim of reaching out to the non-specialist, or amateur. This could be said of the early issues of *JBIS*, whose ethos was remarkably similar. It comes as no surprise, then, that from the third issue of *Practical Mechanics* the BIS introduced a regular contribution to the section 'What the Clubs are Doing', which summarised the recent activities of such organisations as Streatham Common Model Railway Club and Sheffield Aero Club. Figure 22 shows the first such entry, written by BIS founder member L J Johnson, and these notices appeared in the 'clubs' section from December 1933 to October 1934. Meetings were

[389] Camm, F J (1933): 3

[390] *Ibid.*: 3

publicised 'for the reading and discussion of papers ... on rocketry and kindred subjects'[391], which would be held every other Friday at 81 Dale St., Liverpool. Other brief notes on the meetings were included, such as a mention of Cleator's visit to the German rocket society, and the announcement of the winner of a design contest for the cover of the BIS Journal.



December, 1933 PRACTICAL MECHANICS

What the Clubs are Doing

Club Reports for inclusion in this feature should not exceed 250 words in length, and should be received not later than the 14th of each month for inclusion in the subsequent month's issue.

THE MODEL RAILWAY CLUB

THURSDAY, September 28th, was the first Track Night since the holiday season, and was well attended. Voting took place in accordance with the rules of the Models Competition, which resulted in Colonel R. Henvey, C.M.G., D.S.O., Mr. C. R. Wood and Mr. L. R. Ellis winning first, second and third place, respectively. Thursday, October 12th, was the date of the Annual Rummage Sale. A very large number of models and parts of models were on view, the selling of which provided a very interesting evening.

Fixtures for November were as follows: Thursday, November 9th, General Meeting. Thursday, November 23rd, Track Night. Full particulars of the Club may be had from Hon. Secretary, J. C. Watts, 85 Wood Vale, N. 10.

ILFORD AND DISTRICT MODEL RAILWAY CLUB

THE Club commenced its winter programme with the Annual Dinner at the Gatehouse Restaurant, Ilford, on September 12th, a very enjoyable evening being spent by all present.

On Saturday, the 18th, we were entertained by our President at his country house, where we spent an enjoyable time operating his 7½-in. gauge garden railway. Our sincere thanks are due to Dr. and Mrs. Watts for making the time spent so happy.

On Wednesday, October 4th, we had a very welcome visit from Mr. Shepherd, of the Wimbledon Club. A

December 15th: "Britain's Largest Railway" Lantern Lecture. Notes read by the Chairman.

We have had two very interesting lectures already. One by Mr. W. H. Hart on "My Engines" and another by W. F. Gentry, Esq., on "Mass Production to Super Detail," describing what can be done to a Bing 2–4–0 tank locomotive.

We welcome new members and any friends to our meetings. Further particulars from General Secretary, L. J. Ling, Brooke House, Rotherhill Avenue Streatham, S.W.16.

THE PARK MODEL AIRCRAFT LEAGUE

MEMBERS of the above Club have been flying on Tooting Common for the past eighteen months. Permission has now been granted to fly on Mitcham Common, and a branch has been started there. The two flying grounds are within easy reach of Balham, Clapham, Croydon, Hackbridge, Mitcham, Norbury, Streatham, Tooting and surrounding neighbourhoods. The Mitcham Common ground is situated at the terminus of the 5 and 50 'bus routes and the tramway from Croydon to Mitcham passes the field. Present membership number is 48. Entrance Fee, 2*s.* 6*d.* Annual subscription, 3*s.* seniors and 2*s.* school members. Further details will be sent to any interested Aeromodellist on application to the Hon. Secretary, 112 Rodenhurst Road, Clapham Park, S.W. 4.

Next evening meeting at the Streatham Hall on Friday, January 5th.

Annual General Meeting and Election of Officers on Friday, February 2nd.

THE BRITISH INTERPLANETARY SOCIETY

MEETINGS for the reading and discussion of papers of the above Club on Rocketry and kindred subjects are held at 81 Dale Street, Liverpool, in Room 15, on the 2nd Floor, from 6.30 to 9 p.m. every other Friday from November 10th. Subscription: Fellows, £2 2*s.* per annum: Members, 10*s.* 6*d.* per annum: Juniors, under 21 years, 5*s.* Subscriptions are payable quarterly. All members will receive free copies of the Journal of the Society, which is published quarterly, and contains news of developments in matters of interest to the Society. President: Mr. P. E. Cleator, A.M.I.R.E., A.M.I.E.T. Honorary Secretary: Mr. Leslie J. Johnson, 46 Mill Lane, Old Swan, Liverpool, 13.

THE NORTHAMPTON COLLEGE OF

Figure 22 - 'Clubs' section of *Practical Mechanics* - note BIS entry bottom-right

Source: *Practical Mechanics* **1**(3): 151

Having said this, the BIS may have looked somewhat incongruous amongst the names of what were for the great majority, model-making clubs. In contrast to such groups, the BIS had full-scale ideas about the development of interplanetary travel, and wanted to avoid being mistaken for a provincial rocket club or group of model hobbyists. Nonetheless, in the absence of nationally-distributed publications devoted to the as-yet undeveloped science of astronautics, and bearing in mind the limited distribution of *JBIS* to members only, the BIS had to make do with *Practical Mechanics*. It remains unclear why the BIS stopped advertising in *Practical Mechanics*. A perceived negative association with model clubs may have been a factor, as well as cost. However, the BIS did return to the publication in 1939, as it re-printed

[391] What the Clubs are Doing (1933): 151

its design for a powder-fuelled Moon rocket from its *JBIS* article from January of the same year.

Adding to this genre of popular science, *Armchair Science* appeared from 1929 to 1940 with the financial backing of the publisher Jack Courtauld and the aviation pioneer Lord Brabazon of Tara[392].

Figure 23 - *Armchair Science* **1**(1)

[April 1929]

This publication was 'aimed at the reader who wanted a quick and relatively painless guide to modern scientific and technical developments'[393], and went on to achieve a significant national circulation of 80,000 a month[394], whilst having an ongoing association with the BIS during the 1930s.

The front cover of the first issue supplies us with insights as to the placement of *Armchair Science*. It features two images linked together, one of a man reading in an armchair, the

[392] Bloom, U (1958): 97

[393] Bowler, P (2006): 180

[394] Bloom, U (1958): 98

other of a scientist in a laboratory coat conducting experiments, a montage which represents an intellectual connection between the amateur and the professional. A M Low, who joined the BIS in 1934 and was to become its second President, at first contributed to *Armchair Science* as a Technical Adviser, and later became the principal editor. Under Low's editorship a series of articles on space travel appeared[395], including by Cleator and Willy Ley, adding to the contention that the pre-war BIS developed a concerted strategy to engage with the public through nationally-distributed popular science magazines. Cleator's contribution to *Armchair Science* was essentially a short informative piece that aimed to debunk the myth that rockets need air to 'push against', and therefore could not function in a vacuum. The article was generously illustrated with photographs of German rocket experiments, and Cleator, whose name appeared above the title 'President of the British Interplanetary Society', went on to explain through analogy how a rocket would work in the vacuum of space:

> 'Let us imagine a gun being fired in space. It is difficult to conceive the recoil not occurring, despite the lack of air ... the only essential difference between the firing of a gun and of a rocket is that the former spews out solid bullets, and the latter gaseous ones'[396]

This explanation is one of the simplest ways in which to imagine the key physical processes of rocket science that is still just as effective today, and that such a succinct and informative piece of writing occurs in a popular magazine illustrates the importance of such engagements with a public readership for the BIS. This also brings attention to the problem of negative or incorrect publicity, which, through various media, propagated either a sensationalised or

[395] Cleator, P E (1957): 70

[396] Cleator, P E (1935b): 240

scientifically incorrect version of interplanetary flight. This passage also highlights the serious nature of popular science writing at this time, promoting concepts that were not particularly eccentric or extraordinary, but merely ahead of their time.

The placement of space-related articles by the BIS into an intellectual space somewhere between the laboratory and the armchair seems to have been borne out of two principal factors. Firstly, because the BIS had national, international and, indeed, interplanetary ambitions, they had to reach beyond the audience for scholarly science and into a more popular realm in order to publicise and finance their plans through member subscriptions. Second, this movement away from established or academic science was partly due to a rejection of their ideas by traditional establishments such as the scientific journal *Nature.* In 1939, the BIS sent a copy of their *Journal* to its editors, presumably hopeful of some favourable publicity. The issue sent to *Nature* contained the iconic 'BIS Spaceship' article (see Chapter 4), however, the resultant paragraph in an anonymously-written 'News and Views' section was not exactly what the BIS would have had in mind:

> 'We have received vol. 5, no. 1 of the *Journal of the British Interplanetary Society* [which] contains designs for a "space ship" intended to perform a voyage to the moon and back. While we may invite the charge of obstructionism if we dismiss the whole affair as a wild-cat speculation, it is necessary for us to remark that, while the ratio of research results accomplished to speculative theorising is so low, little confidence can be placed in the deliberations of the British Interplanetary Society.'[397]

Although the *Nature* criticism contains a valid point about the speculative nature of the plans of the BIS at this time, it also comes across as somewhat sardonic, and it seems as though

[397] Interplanetary Travel (1939): 635

this reviewer simply did not believe that the Society's vision of space exploration was plausible. This view is contextualised by a short article in the same section of the journal celebrating the bicentenary of the astronomer William Herschel, that went into some detail about 'modern' astronomy and the structure of the universe[398]. Clearly, therefore, the subject of interplanetary science, and in particular astronomy, was not scorned upon by *Nature* at this time, but it seems to have been the character of the BIS and their ambitions of interplanetary *travel* that attracted criticism. Evidently, the BIS found a more comfortable and welcoming home in publications such as *Armchair Science* and *Practical Mechanics* than the academic journals, despite their intentions to gain publicity through both types of media.

Whilst newspapers and specialist magazines provided the BIS with limited outlets for self-promotion, perhaps the most effective way in which the BIS publicised itself and the cause of interplanetary travel was through Cleator's non-fiction book *Rockets Through Space*, published in 1936. Having attracted over fifty reviews in newspapers and periodicals[399], the release is credited as having a positive effect on BIS membership[400], causing 'an avalanche of enquiries' to be dealt with by the Society's secretary L J Johnson towards the end of 1936[401]. It is therefore appropriate to examine in closer detail the methods through which Cleator engaged his readers and the vision he set out for interplanetary travel in *Rockets Through Space*.

In essence the book's thesis is that the two key elements to interplanetary travel are the technology of the rocket and the science of astronomy. Cleator foresees that the rocket is

[398] Herschel's Researches on the Structure of the Heavens (1939)

[399] These reviews, in publications ranging from the Yorkshire Post to the San Francisco News, have been collected as original cuttings, and kept in a scrap book now held at the BIS archive in Vauxhall, London.

[400] Parkinson, B (2008) (ed): 11

[401] Johnson, L J [Unpublished copy of typed memoir]: 55

the only form of propulsion that will effectively work in the vacuum of space, whilst explaining how knowledge already gained of astronomical bodies in the Solar System means that navigation through space can be planned and predicted in advance, unlike earlier forms of terrestrial exploration. Cleator devotes a substantial section of the book to what he calls 'the evolution of the rocket motor'[402]. Appropriating the language of evolution and applying it to technological developments was a technique later adopted in the writing of Arthur C Clarke, and it is interesting to see it used here, at such an early moment in the history of space exploration. The implication of such language is that technology develops naturally and progressively, from an early, embryonic status, towards its present form and beyond. As such, Cleator describes the Chinese fire-arrows of the middle-ages and the rockets of Sir William Congreve[403], before identifying 'three pioneers of modern rocketry': Goddard, Oberth and Esnault-Pelterie, whose work represented 'three lines of reasoning which were later to unite and add a new tributary to the river of knowledge'[404].

Cleator goes on to explain in detail, using plain language and simple diagrams, the development of the Mirak rocket programme of the *VfR*, which aimed to use liquid fuels (petrol and liquid oxygen) to propel a 'minimum' sized rocket through the atmosphere. Figure 24, Figure 25 and Figure 26 show Cleator's diagrammatic interpretations of the Mirak programme, through which different models were developed through trial-and-error. The basic premise of 'Mirak 1' was to combine petrol and liquid oxygen in a combustion chamber, where they would ignite and generate thrust in the opposite direction to the exhaust vent. According to Cleator, 'the method employed to force the fuels into the

[402] Cleator, P E (1936): 35

[403] A portrait of Congreve now adorns the lobby of the BIS in Vauxhall, London.

[404] Cleator, P E (1936): 40

combustion chamber was simplicity itself'[405]; the liquid oxygen forced through under its own pressure, and the petrol pushed into the chamber by a small CO2 charger. After a number of tests, the first Mirak exploded. Following this, incremental improvements to the design are described, including a ceramic coating to the combustion chamber, which was changed in shape from a cone to a cylinder; and a safety valve in the nose cone, where the terminal explosion had taken place on the previous model. However, once again the device exploded, and a third model was made, this time with cooling mechanisms around the combustion chamber, and the addition of a second 'leg'. It is possible to make the claim that these designs are only a few steps away from the more powerful and, ultimately, destructive, German rockets of the 1940s which, in turn, provided the model for the American and Soviet space rockets of the 1950s and 1960s.

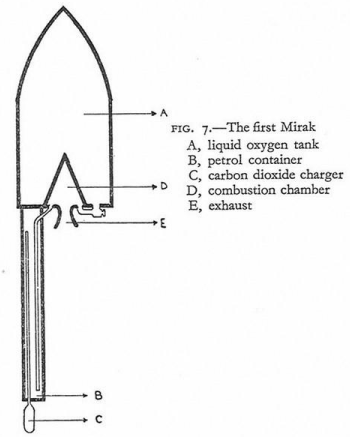


FIG. 7.—The first Mirak
A, liquid oxygen tank
B, petrol container
C, carbon dioxide charger
D, combustion chamber
E, exhaust

Figure 24 - First 'Mirak' Rocket

Source: Cleator, P E (1936): 48

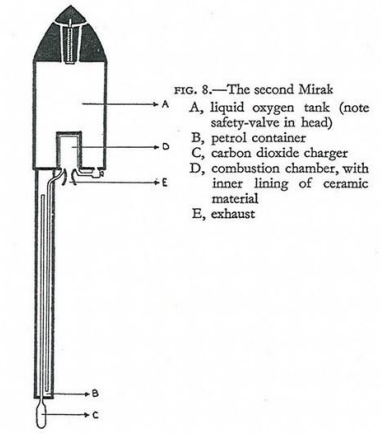


FIG. 8.—The second Mirak
A, liquid oxygen tank (note safety-valve in head)
B, petrol container
C, carbon dioxide charger
D, combustion chamber, with inner lining of ceramic material
E, exhaust

Figure 25 - Second 'Mirak' Rocket

Source: Cleator, P E (1936): 51

[405] *Ibid.*: 47

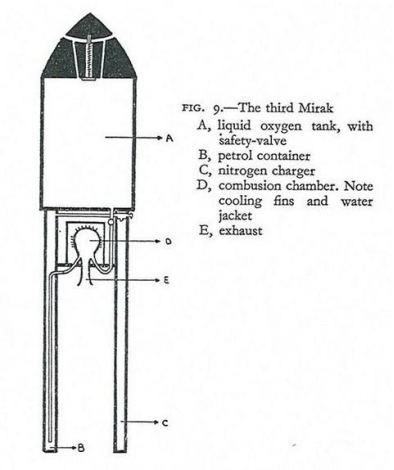


Figure 26 - Third 'Mirak' Rocket

Source: Cleator, P E (1936): 54

These accounts of rocket design, echoing evolutionary language, represented by what could be described as anatomical diagrams, and explaining incremental improvements, combine to engage the reader through imparting knowledge about rocketry. This was an effective means by which to enrol new interest in interplanetary thought, as a reader with little technical know-how would be able to gain an appreciation of the complexities of rocket science. Cleator uses a similar technique in another chapter about interplanetary navigation, using the analogy of a race track to describe the orbits of the planets around the Sun, and therefore explain some of the complexities of space travel. Having outlined the more technical aspects in this way, the book ends with an expansive vision of a future society having established an interplanetary network of space ports, which would demonstrate the 'progressive nature of man'[406]. Such visions are examined elsewhere in this thesis, but here the main point to emphasise is that Cleator's use of language, analogy and careful explanation, were essential tools in bridging the divide between the science of interplanetary travel, and the wider popular audience.

An important element to this discourse of interplanetary science were the press reviews of *Rockets Through Space*. Numerous articles published in regional, national and foreign papers contained references to the BIS, raising awareness through Cleator's status as President. In

[406] *Ibid.*: 214

the press cuttings book now held at the BIS archive, the majority of articles about the BIS in the pre-war period were, indeed, reviews of Cleator's book, some of which simply mentioned the release and its content in one sentence, others going into more detail. Generally speaking, the tone of the reviews was positive, and whilst some mentioned the release with a degree of flippancy, most made note of the detailed nature of Cleator's accounts of rocketry and interplanetary navigation, and traded on the interesting nature of the book's subject matter with eye-catching headlines. The Yorkshire Post offered the most extensive review, in a full-page article[407] which clearly trades on Cleator's personality to generate interest, introducing him as 'a visionary' in the opening sentence, with a large full-length portrait printed in the centre of the page. Although he did not seem to consciously promote himself as a 'well-known scientist'[408], journalists seem to have picked up on Cleator's eccentricity at a time when he was trying to promote the Society in a variety of ways and treading a careful path between credibility and popular appeal. In this way, sections of the media may have been attempting to trade on the notion of the Victorian English eccentric, a 'harmlessly quirky individual [who is] amiable and somewhat ludicrous by nature'[409], an approach which would have been at odds with what the BIS sought to stand for at this time.

Whilst Cleator did not seem to actively encourage the development of a media-driven 'persona' around himself, the same could probably not be said about the second President of the BIS, Archibald Montgomery Low. The character and career of A M Low sheds light on the philosophy of the BIS in the pre-war period, and his role in the wider culture of British outer space I would argue is similar to that of Patrick Moore from the mid-1950s onwards, albeit

[407] Davy, C (1936)

[408] As suggested by one brief review in the New York Post (29/7/1934)

[409] Gill, M (2009): 2

on a smaller scale. Cleator became aware of Low in the course of his 1934 trip to Berlin. Here, he asked to be informed of any British nationals who had contacted the *VfR*, and Cleator's friend Willy Ley duly provided him with a list, in which the name of A M Low was prominent. On his return, he made contact with Low who readily became a Fellow of the BIS, interested as he was in the development of rocketry and its application to space flight[410].

Along with Arthur C Clarke and Patrick Moore, Low is one of the few prominent members of the BIS to have had his biography written. A generation older than Clarke and Moore, Low died in 1956, and his biography was published two years later. The author, Ursula Bloom, once appeared in the *Guinness Book of Records* as the world's most prolific female writer, and she specialised in biographies and 'atmospheric romances'[411]. Bloom was a friend of Low, and presents him as a flawed genius, one photograph caption reading 'a great man at work in his laboratory', and another reads 'the lone inventor'[412], whilst she presents herself as 'the humble editor' of Low's accumulated personal notes on his inventions and his life. An introduction is written by Lord Brabazon of Tara, who was famed as the first Englishman to pilot a heavier-than-air machine under power in England in 1909, and went on to become a Member of Parliament, and Minister for Aircraft Production during the Second World War[413]. Brabazon's association with Low was established through *Armchair Science,* as recounted earlier in this chapter. This is a further indication of Low's connections in the engineering community, and although Brabazon indicates that he did not know much about Low's private life, he provides certain insights into his reputation in political and scientific circles that were unavailable to Bloom, who knew more about his personal life and practical achievements.

[410] Indeed, Low had been granted a patent for an improved rocket design as early as 1918 (Cleator, P E (1986): 151)

[411] Wright, J D (2004) [online]

[412] Bloom, U (1958): 10

[413] Brabazon of Tara, Lord (1956)

Low was not, for the most part, formally associated with academic science, but this did not detract from the magnitude of scientific and mechanical work which he carried out (albeit with mixed results) over the course of his career, through which he came to be known as an inventor. This is a recognition given to him in his biography:

> 'Had he persevered with his television research (1914), his guided missile (1917), and so many other of his inventions which *he saw first*, he might have been the greatest genius of his time.'[414]

Low's inventions amounted to well over a hundred patented devices, ranging from a submerged floating bomb to an automatic garage door. Although he devoted a considerable amount of time to inventing, Low made his living as a writer and editor, and later in life, as an after-dinner speaker. In this respect, the maintenance of a public persona was of key importance to Low's career in the world of popular science. This has been attributed to 'a single vain streak [and an] admiration for the limelight, love of publicity, and of success'[415], and this leads us to his somewhat ambiguous status as 'Professor'. He held a position as 'Associated Honorary Assistant Professor of Physics' at the Royal Ordnance College from 1919 to 1922, and continued to be known as 'Professor A M Low' ever since, including in his biography, and in one obituary[416]. However, other references suspend his title in quotation marks, and it was generally known that, strictly speaking, he was not entitled to the prefix. As such, Low is said to have 'traded on' his title, and 'his general appearance, with strange hat and rather long hair, was an effort to convey "professorship"'[417]. Some understanding of

[414] Bloom, U (1958): 6 [italics in original]

[415] *Ibid.*: 30

[416] Although this short obituary in 1956 (*JBIS* **51**: 351) was written anonymously, other sources reveal that Philip Cleator was the author.

[417] Brabazon of Tara, Lord (1958): 11

Low's personal iconography can be gained through Figure 27 and Figure 28, which picture him at work. Although the purpose of these photographs is unspecified, imagery of Low the inventor doing interesting experiments, or testing unusual devices, would have contributed to the sense that he was 'one of those men people wanted to know about'[418].

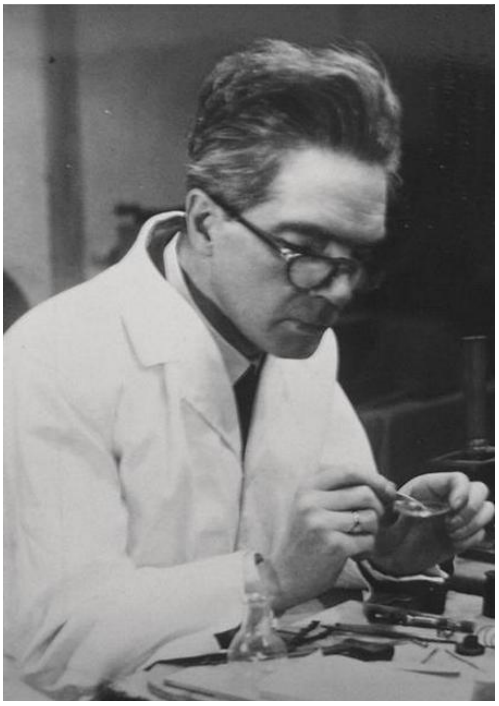


Figure 27 - A M Low in the Laboratory

Source: *From Imagination to Reality - An Audio History of the British Interplanetary Society* (2008) [multimedia CD]

Figure 28 - A M Low 'lighting a cigarette with ice'

Source: Bloom, U (1958): 129

[418] Bloom, U (1958): 97

This sense of public recognition helps us understand why the BIS decided to install Low as President in 1937. The transfer of power in the BIS from Liverpool to London has been accounted for in earlier chapters, and Low represented, from one perspective, a convenient figure to lead the BIS, as he had an office in London which could made use of, and was already a Vice-President of the Society. However, BIS members also saw the advantages of having a well-known personality as a figurehead of the Society. Cleator, for one, viewed Low as 'a brilliant eccentric with a penchant for embracing what, at the time, were dismissed as wild and improbable ideas'[419]. Furthermore, in 1938, future BIS Chairman Val Cleaver described Low as an 'interesting personality [who] has a flair for publicity which might be useful [to the BIS]'[420]. However, this public image sometimes attracted negative associations, and Cleaver later suggested that 'Low is more like the popular idea of a great inventor than a genuine great inventor', and that 'by technical people outside the Society he is regarded as a bit of a fraud'[421]. Such antipathy is also picked up on in the introduction to Low's biography:

> 'It was strange that someone so mild, quiet and imaginative should somehow stir up such bitter antagonism. I think a good deal of it was due to his irregularity in calling himself 'Professor'. Scientists are fussy over this.'[422]

This poor reputation which Low had seemingly developed in the scientific community caused some elements within the BIS to want to exclude him from the Society when it re-formed after the war. Cleator recalls that;

[419] Cleator, P E (1986): 151

[420] Personal memoranda: Val Cleaver, 1/2/1938

[421] Personal memoranda: Val Cleaver,25/6/1939

[422] Brabazon of Tara, Lord (1958): 11

> 'The reason given for the proposed exclusion was that Low's standing in the academic world was such that his presence promised to be a disincentive to other members of the scientific hierarchy who might otherwise condescend to join our ranks.'[423]

This debate, which simmered below the surface in the pre-war period, came to prominence at a time when the BIS wanted to be seen as more of a professional, serious organisation in the immediate post-war period. Moreover, the controversy serves to highlight, once again, the middle-ground between professional and amateur science, in which the BIS was at times struggling to occupy against pressure from the scientific establishment on one side, and the need to popularise and promote the Society on the other.

It is, therefore, important to reflect on the positive effect that this sense of A M Low's 'persona' brought to the BIS, and part of this involved using his contacts in the publishing industry, as already discussed with *Armchair Science*. Overlapping thematically with the popular science genre at this time was an influx of science fiction 'pulp' magazines from the United States that were sent over in huge quantities as ships' ballast, including such titles as *Amazing Stories* and *Astounding*[424]. One of the first British publications to add to this genre was *Scoops*, a youth-oriented science fiction paper, which had a fleeting existence of only twenty issues in 1934. Printed in tabloid newspaper format with a basic two-tone colour front page, it contained illustrated stories with titles including 'The Launch of the Space Ship' and 'The Flying Robot', and was sold for two pence (See Figure 29).

[423] Cleator, P E (1986): 151

[424] Clarke, A C (1989)

Figure 29 - Three covers of *Scoops*. Sources: *BIS Archive*: Unmarked box; *From Imagination to Reality - An Audio History of the British Interplanetary Society* (2008) [multimedia CD]

Low's contribution, as the only science fiction writer who was credited in *Scoops*, was a serial entitled 'Space', in which three young adventurers are rocketed towards the planet Mars. Low's status as author of the series is capitalised upon by *Scoops*, his name appearing both on the front cover (See middle cover in Figure 29) and in large lettering across the middle of the opening page, with a portrait displayed alongside a short profile naming him 'one of the most distinguished scientists and inventors of modern times'[425]. The illustrative header, which shows a rocket heading through outer space towards an unidentified planet, contains an opening trailer:

> 'No-one knows what is in Space. Only the Scientist can Foretell – and in this thrilling yarn Professor A M Low dares to Prophesy'[426]

One other contributor to *Scoops* was the ubiquitous Cleator, writing a non-fiction 'weekly up-to-the-minute news feature on matters Inter-planetary'[427]. This feature was to continue a

[425] The Man Who Made Television Possible (1934)

[426] The Wonder Machine (1934) [erratic capitalisation in original]

[427] Cleator, P E (1934e): 420

few years later in *Tales of Wonder,* founded in 1937 by BIS member Walter Gillings as the first British adult science fiction magazine. Preceding this publication were three fan magazines, *Novae Terrae* (1936), *Scientification* (1937) and *Tomorrow* (1937), which are said to have been 'the key to bonding science fiction in Britain'[428], and were produced in the homes of science fiction fans. Arthur C Clarke is known to have been involved in the production of *Novae Terrae*, whilst A M Low contributed to *Tomorrow* with a speculative article about the future of science[429]. The science fiction pulps also contained contributions by other members of the BIS, including Clarke, who, according to cultural historian Mike Ashley, made his professional debut in the fifth issue of *Tales of Wonder*, as well as William F Temple, whose story 'Lunar Lilliput' was one of the only pieces of fiction to explicitly mention the BIS[430]. The content and wider implications of British science fiction shall be examined in greater detail in the following chapter, but suffice to say here that the spheres of the amateur scientist and the amateur storyteller overlapped to a significant degree at this time. Furthermore, the identities of some of the main writers were exploited to create a sense of recognition and expertise, a pattern that was to serve as a useful publicity outlet for the BIS in the 1930s.

Part of the explanation behind this publication strategy of the BIS was to do with the limitations of the BIS journal. *JBIS* was only available to members, because, primarily, the cost of wider distribution would have been prohibitive, and, second, the BIS wanted to retain an element of exclusivity to their flagship journal, thereby encouraging those interested to become fully paid-up members. In the absence of a capability to publish a national journal, the BIS took advantage of the already-existing popularity of publications such as *Armchair*

[428] Ashley, M (2000): 128

[429] Low, A M (1937)

[430] Ashley, M (2000): 130

Science and *Practical Mechanics*, and pushed the boundaries of publishing predictability with the insertion of the BIS into the emergent British science-fiction magazines of the late-1930s. With the advent of war in 1939, most of these magazines ceased publication, and Ashley has noted that the late-1930s witnessed 'a final glow of Britain's aspirations of future science'[431], a type of vision that would change dramatically following the Second World War. Not only would the BIS have to re-form among the ruins of London in 1945, but it would also have to take a new approach to science itself, not being able to rely on the optimistic outlook of the pre-war wave of popular science, and having to deal in particular with the new spectre of the capabilities of the atomic age.

Astronomy and the mediation of British outer space in the post-war period

The BIS underwent a number of changes after it re-formed in 1945. As recounted in Chapter 5, the psychological and physical impact of the V-weapon bombardment of London was substantial, and contributed to a new sense of seriousness about the rocket. Far from being disenchanted by the destructive capabilities of the rocket, BIS members saw the early post-war period as providing a unique opportunity to promote space flight, and it quickly latched on to the potential of the V-rockets with a design for a man-carrying rocket based on the V-2[432], amongst other articles that highlighted the technical capabilities of the V-2[433]. Less common was the pre-war pattern of positive descriptions of the application of technology to space flight, alongside flippant or 'crackpot' criticism in the press. Furthermore, in a climate of economic austerity and rationing, the publishing options for the BIS were limited, when compared to the multitude of science-fiction and popular science publications that they took advantage of in the 1930s. The new realities of the immediate post-war period also affected

[431] *Ibid.*: 132

[432] Smith, R A (1948)

[433] Humphries, J (1946)

the key personnel in the BIS, as Cleator and Low were marginalised in favour of a new group of London-based leaders, which consisted of Eric Burgess (Chairman 1944-45), Arthur C Clarke (1946-47; 1951-53), Val Cleaver (1948-50), Les Shepherd (1954-56, 1957-60) and Ralph A Smith (1956-57). Gone were the full-page portraits in newspapers, and quirky space stories in magazines, as the BIS focussed on the engineering challenges of space flight. Despite, or perhaps because of, this new approach, membership of the BIS grew rapidly in the period from 1945 to 1955, when it was approaching 3,000. In this context, it could be argued that the Second World War was the most effective piece of publicity that the British interplanetary project ever had, and that the related technical leaps forward convinced more people that space flight through rocketry was possible than any amount of articles in popular science magazines could have done.

Whilst the science of rocketry gained credibility in this period, the Second World War had unexpected consequences for astronomy, which were to have a knock-on effect on the wider culture of British outer space well into the post-war period. Astronomy in the first half of the twentieth century was largely shaped by the development of two groups in the nineteenth century. In 1820 the Royal Astronomical Society (RAS) was formed, as the number of committed astronomers in England 'had grown to the point where there was the need for the type of forum that only a specifically astronomical society could provide'[434]. This pattern of professionalisation could be found in other disciplines in the nineteenth century, which typically involved the formation of Royally-chartered societies and the establishment of academic departments in universities. However, the establishment of the British Astronomical Association (BAA) in 1890 disrupts this narrative, as a new amateur dimension was added to astronomy, which took place outside the academy. The objectives of the BAA were,

[434] Hoskin, M and Dewhurst, D (1999): 221

> 'The association of observers, especially the possessors of small telescopes, for mutual help, and their organisation in the work of astronomical observation ... the circulation of current astronomical information [and] the encouragement of a popular interest in astronomy.'[435]

The BAA was not founded as a rival to the RAS, but was intended for those who found their subscription rates too high, the discussions too technical, or, being women, were excluded from the RAS. This popular, or amateur aspect was set to thrive well into the twentieth century, whereas astronomy as an academic discipline was gradually absorbed by physics departments in universities.[436] The BAA founder membership numbered 496[437] and quickly rose to 1,000, which was the initial target amount. After fluctuating around this level in the early-twentieth century, the numbers dropped off slightly during the 1930s, before unexpectedly rising again during the Second World War. One of the geographies associated with astronomy is the search for dark or clear night skies, a requisite which has seen telescopes set up on mountain-tops and away from major conurbations[438]. The intensity of the enforced black-outs during the wartime Blitz of 1940-41 created an exception to this pattern, as large populations in London and other cities were subjected to a removal of artificial light at night-time. This, combined with domestic consequences of the Blitz such as manning gun turrets, fire-watching and widespread sleep deprivation, had the effect of

[435] McKinn, R (1990): 8

[436] This pattern might explain the relative lack of contact between the BIS and the academic structures of astronomy. As we have seen elsewhere in this thesis, the Society seemed to co-operate more with non-academic groups such as the BAA and professional engineering firms.

[437] Email correspondence with Anthony Kinder, Director of the Historical Section of the BAA, 19/11/09

[438] A substantial array of observatories operates from the mountain-top location of Mauna Kea in Hawaii, whilst Patrick Moore's resident town of Selsey, West Sussex, occupies the end of a coastal peninsula, and is well-known for its clear night skies.

revealing the night sky to the British population[439]. Furthermore, a sense of a prevailing upward gaze was re-enforced by the illustrated press and public information notices, encouraging vigilance and promoting a hopeful, forward-looking attitude, to the extent that 'looking up was suddenly normal'[440]. One side-effect of these behavioural patterns was undoubtedly a new popular interest in astronomical observation, and membership of the BAA rose dramatically from around 900 in 1939, to over 1,500 by 1945.

The rise of popular interest in astronomy during and after the war was complemented by the development of radio astronomy in Britain in the same period. Scientists had been aware of forms of electromagnetic radiation other than light since the late-nineteenth century, however it was during the Second World War that J S Hey, a British Army research officer, made significant discoveries in extra-terrestrial radio emissions, having been tasked with identifying sources of interference that might impede the effective operation of Britain's radar[441]. Following these discoveries, many young researchers chose to stay on in universities and continue their work, and in this way a new field of space exploration opened up at Cambridge University and at Jodrell Bank in Cheshire. Jon Agar has accounted for the development of this new science, placing it in a context of networks between scientists, civil servants and the military that facilitated greater funding of science and a rise in the authority of the scientist[442]. In this way, the split that had opened up between amateur and professional astronomy in Britain was widening, with the academic science of radio astronomy on one side, and popular or amateur astronomy on the other. As has been noted in the previous chapter, the BIS actually took relatively little notice of radio astronomy in

[439] McKinn, R (1990): 50

[440] Taylor, J (1994): 206

[441] Edge, D and Mulkay, M (1976): 12

[442] Agar, J (1998)

these years, despite the significant advances it pushed through in the understanding of meteors, the sun and other stars. In the Society there was, however, alongside a dominant interest in what was becoming known as 'astronautics', a strand of popular astronomy that was to culminate in the late-1950s through the work of Patrick Moore.

Whilst most widely known for his television programme *The Sky at Night*, which will be discussed towards the end of this chapter, Moore was also an active and influential member of both the BIS and the BAA, having joined the former sometime in the 1930s[443] and the latter in 1934, at the age of eleven[444]. He was to have an ongoing association with both groups, as editor of the BIS popular magazine *Spaceflight*, and as a President of the BAA, whilst he was also active to a lesser degree within the RAS. In his own words;

> 'There was the BIS, the BAA and the RAS; they were my three.'[445]

Although Moore was a fellow of the RAS, it was in the field of amateur astronomy that he felt most comfortable, and he helped form the Society for Popular Astronomy in 1953, whose intention was to reach out to beginners and help them in the first stages of amateur astronomy. This society still thrives today, with over 3,000 members[446].

Alongside the overriding passion for astronomy, Moore had an active interest in science fiction – he 'devoured Jules Verne, H G Wells, and teenage periodicals such as 'Modern Boy''[447], penned a quite substantial compendium of what he called 'boy's novels', and even

[443] Interview with Patrick Moore, 2/11/09. Moore's comments are somewhat incongruous with the BIS member lists, which don't record his membership until 1948.

[444] Moore, P (2003): 11

[445] Interview with Patrick Moore, 2/11/09

[446] Society for Popular Astronomy (2010) [online]. This group was known as the Junior Astronomical Society until 1994.

[447] Moore, P (2003): 16

appeared in a little-known science fiction film in the mid-1950s[448]. Moore wrote twenty-four of his boys' adventure stories, published between 1952 and 1980, which were set in space, on the Moon and on Mars, including such titles as *Destination Luna* (1955), *Wheel in Space* (1956) and *Spy in Space* (1977). These have been described as 'jovial, though stereotyped, and popular in their day'[449], and Moore's frequent output of around two novels per year in the mid-1950s bears comparison with other writers of children's adventure stories such as Willard Price. By his own admission, Moore 'had no intention of being scientific'[450] in his fictional works, and a selection have been examined here in order to establish their tone, subject matter and any references to the BIS. From this review it can be ascertained that Moore's first novel, *The Master of the Moon* (1952), establishes a template that was to be used for many of his subsequent narratives. In this first novel, two young, male protagonists stumble across a house in the English countryside, surrounded by a barbed-wire fence, inside of which two older 'scientific investigators' are building a rocket ship to take them to the Moon. Inevitably, the two teenagers are invited along for the ride, and on the Moon they discover colonies of, quite literally, little green men, living under the surface of the Moon, in a manner not unlike the 'Selenites' of H G Wells' novel *The First Men in the Moon* (1901). A villain is encountered, a Russian scientist whose intention is to become the 'Master of the Moon'. Alongside the clear rhetoric of Cold War villainy, other interesting aspects to Moore's novels are the establishment of the southern English countryside as a launch-pad to outer space, as well as the books' targeted audience, teenage boys. This perhaps reflects that Moore was writing about what he knew best. He lived much of his early life in East Grinstead in Sussex, and started his career as a secondary school teacher. As such, he would have been

[448] BBC News (2010) [online] The film was entitled *Them and the Thing*, and was the work of aristocrat Desmond Leslie, who was a friend of Moore.

[449] Nichols, P (1981): 408

[450] Moore, P (2003): 17

familiar with the behaviour and ambitions of teenage boys, whilst at the same time he was developing a reputation as an astronomer, with a keen interest in the planets of the Solar System. Although Moore was a member of the BIS in the early-1950s, references to the Society are not directly apparent in his novels, although on some occasions the 'desert colony of Woomera'[451] is enrolled in much the same way as in Clarke's *Prelude to Space* (1953). More frequent are mentions of the Royal Astronomical Society, including in *The Master of the Moon*, where the old scientist reluctantly embarks on his Lunar mission with the intention of returning to London in time for a meeting of the RAS[452].

It was in the mid-1950s that Moore became increasingly active in promoting outer space and astronomy, and one way in which he achieved this was through his founding editorship of the BIS popular magazine *Spaceflight*, which was established in 1956. By this time, the primary goal of the BIS, the popularisation of space exploration, had become somewhat at odds with its secondary aim, which was to conduct research pertaining to space flight. This was because the engineering solutions to this problem were becoming tangible, and, as a result, increasingly complicated. Therefore, the average member of the public who had a passing interest in outer space may have been put off had they picked up a copy of *JBIS* in the mid-1950s, which would have included complex equations and abstract concepts. Such issues had been discussed in BIS meetings for a number of years, including at the 1954 AGM, where the question of 'whether the Society should issue two journals' was raised. It was suggested that 'the existence of a technical journal would carry much more weight in technical circles than the present hybrid journal', whilst one other member made the point that 'a disadvantage to having a purely technical journal would be that no-one would

[451] Moore, P (1955): 7

[452] Moore, P (1952): 22

understand much of it'[453]. It wasn't until the following AGM in 1955 that the solution of a second publication was agreed on[454], not more technical than the present journal, but less so, with the sole aim of targeting the general public and stimulating popular interest in outer space. This reasoning was outlined in the first issue of *Spaceflight*, in October 1956, by Patrick Moore:

> 'By issuing this new periodical, we consider that the Society will be better able to play its part in the spreading of knowledge'[455],

Whilst in a piece in the same opening issue by R A Smith, it was argued that:

> 'we cannot publish "popular" versions of these [technical] papers in the journal [*JBIS*] without undermining its usefulness to the professional worker and its standing as a scientific publication.'[456]

Whilst releasing *JBIS* to concentrate on scientific research, *Spaceflight* became the only British magazine entirely devoted to space exploration, and would perform its task of popularising outer space in a number of ways. First and foremost, the new magazine had a larger format than *JBIS*, with glossy, part-coloured covers, typically adorned with artistic renderings of outer space and related objects, as well as a short list of contents, whilst the name *Spaceflight* implicitly held the exciting promise of what was to come in the near future.

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[453] BIS Minute-book: 9th AGM (1954)

[454] BIS Minute-book: 10th AGM (1955)

[455] Moore, P (1956): 1

[456] Smith, R A (1956): 2-3

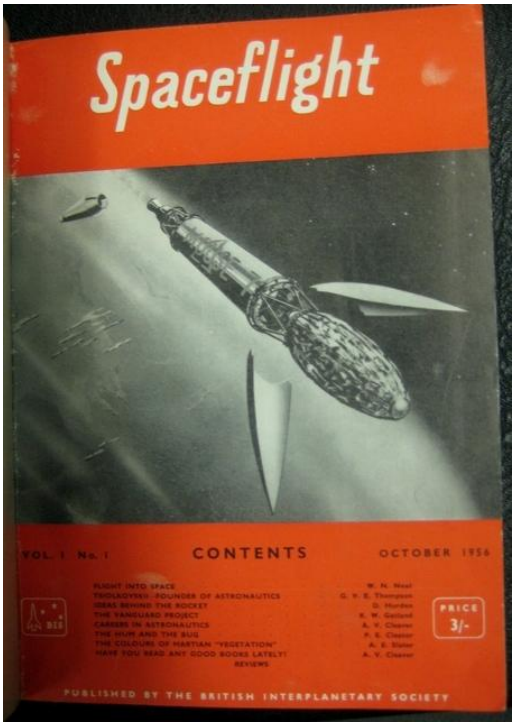


Figure 30 - *Spaceflight* **1**(1) [Oct 1956]

The front cover image is an artistic impression by BIS member John W Wood of a rocket-shaped satellite in near-Earth orbit, with a hazy rendering of the curvature of the Earth and its atmosphere visible in the background. The caption on the back of the front cover goes into considerable detail about exactly what is being depicted in the image:

> 'The artist has attempted to illustrate four sequences leading to the establishment of the satellite (a large inflatable metal-foil sphere) in the orbit: a) release of the second stage booster; b) jettisoning of the ballistic nose cap; c) acceleration of the third stage to orbital velocity, and d) the inflation of the foil-satellite. In practise, d) would not occur until after the propulsion of stage three had ceased.'[457]

All four stages of the satellite adaptation process can be seen in the *Spaceflight* cover image, including the spent booster rocket floating away in the top-left corner, and the nose cap detaching in the foreground to reveal the inflatable foil satellite. Furthermore, the lettering 'MOUSE' is visible on the rocket's flank. This stands for 'Minimum Orbital Unmanned

[457] Inside front cover (1956)

Satellite of the Earth', and represents a design by American Rocket Society member Fred Singer, which was presented at the Fourth IAC in Zurich in 1953. The subject of Earth-orbiting satellites was a 'hot topic' in 1956, as speculation was rife that the Americans were planning to launch such a device as part of its 'Vanguard' programme, which aimed to launch a satellite by the end of the 1957/58 International Geophysical Year. There is little doubt that the BIS sought to trade on this surge of interest with their new publication, and reports on the 'Vanguard' project formed a regular component to the early issues of *Spaceflight*, at least until the unexpected success of *Sputnik 1* in October 1957.

Photographs from the edges of space showing the Earth's curvature entered technological discourses as early as 1946, as a result of high-altitude rocketry experiments carried out by the US Navy Department at the White Sands proving grounds in New Mexico. Some of these rockets were simply adapted from captured V-2s, whilst others, such as the lightweight Aerobee, were purpose-built for high-altitude atmospheric research. Such projects were not explicitly part of a space exploration agenda, as the American researchers were more interested in the development of inter-continental ballistic missiles and the use of rockets for military surveillance. Indeed, the pre-cursor to NASA, the US Special Committee on Space Technology, was not established until 1957. Nonetheless, a remarkable series of seventeen photographs were re-printed in the *BIS Journal* in July 1949, pasted together as composite images, said to be obtained from an altitude of 60 miles, with a panorama covering 2,700 miles of the North American continent[458].

[458] Gatland, K W G (1949): 136

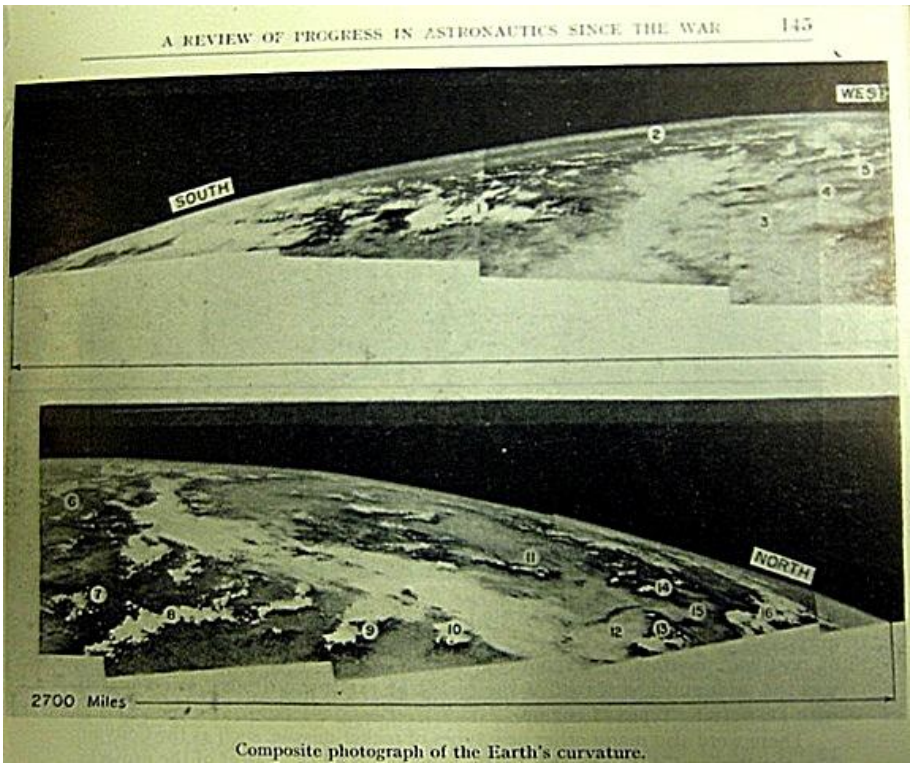


Figure 31 - Photomontages showing the Earth's curvature from space.

Source: *JBIS* **8**(4): 145

These same photographs appeared one year later in the American magazine *National Geographic*, with the same numbering and compass-point labels. They were taken in October 1946 from a camera mounted onto a modified V-2, which was programmed to take one photo every one-and-a-half seconds during the length of its parabolic flight over New Mexico[459]. Although their reproduction was delayed by some three years, it is significant that the BIS beat the American magazine to the chase in publishing these photos, although perhaps this should be expected given the general comparative subject matter of *National Geographic* and *JBIS*. Accompanying the photographs in *JBIS* was an article by Ken Gatland, in which he betrays surprisingly little emotion at what have since been identified as the very first photographs of the Earth from space[460]. The article instead concentrates on the surveillance implications of the images, with labelled sites on the ground explained to the reader with no mention made of the blackness of outer space that occupies the top third of

[459] Holliday, C (1950)

[460] MacDonald, F (2010)**:** 206 [MacDonald refers to the photographs as they were re-printed in *National Geographic*]

the composites. However, the space flight implications of the American research photographs did not go unnoticed to others, including Arthur C Clarke and Philip Cleator, who both used the images to illustrate the opening pages of their respective books *Interplanetary Flight* (1950) and *Into Space* (1953).

In the context of articles anticipating the onset of artificial satellites, the *Spaceflight* cover image can be interpreted as a thematic combination of the high-altitude space photographs of the late-1940s and the design concept for the 'Mouse' satellite, in a speculative yet realistic depiction that foreshadows the better-known Apollo photographs of the Earth from space[461] by sixteen years. Although not unprecedented, the orbital perspective is one that would have been new and stimulating to a popular, non-specialist audience in 1956, made all the more striking by the positioning of the viewer's eye next to the satellite, as if one were floating alongside it in space. These elements would have brought attention to the magazine, whilst the details of the unusual orbital object would draw the reader in for an explanation of what was being depicted.

Aside from its appearance, the tone of *Spaceflight* was also important in its placement amongst other publications. Patrick Moore's opening editorial mentions three times the need to counteract false notions associated with outer space, which he dismisses as 'nonsense ... misconceptions ... and other space-borne crockery'[462]. One such controversy involved the growing number of reports about 'flying saucers' and 'ghost rockets', which appeared in the press in the early post-war period both in Northern Europe and in the United States[463]. Echoing the language of Cleator in the 1930s, Moore became an advocate for the spreading of 'correct information', and appeared on the television programme

[461] Cosgrove, D (1994)

[462] Moore, P (1956): 1

[463] Lagrange, P (2008)

Panorama in 1956, in a 'two-handed discussion' in which he argued against the existence of flying saucers[464]. This factual approach to space-related matters was adopted in *Spaceflight,* and would be justified not simply for its own sake, but in the context of the wider interplanetary project:

> 'It is essential that the opinions of the technician are given due weight, and that they should be considered against a background of soundly formed public opinion ... To exert this influence for good we must strive to place the facts before the public in a form that can be understood, and by carefully considering what we place before them, so that it is free of exaggeration or mis-representation, create a reputation for accuracy and lucidity that commands respect.'[465]

Here, far from being simply a device with which to attract new members, as had largely been the case before the war, a concerted effort was being made by the BIS to promote 'the layman's education'[466], which would ultimately serve to underpin the credibility of research that was being published in the more technical *JBIS*. In line with this educational, almost cerebral tone, the first issue of *Spaceflight* included a basic introduction to rocket technology, and reports from the latest American attempts to launch a satellite. Alongside these types of informative article were lighter pieces such as book reviews, cartoons, and amusing space-related extracts from other publications, thus creating a 'mixed bag'[467] that would offer a more general appeal. Patrick Moore, as the editor, solicited the articles he saw fit, and also vetted the contributions that were sent in for publication with the assistance of an editorial board. On occasion, he sent them out to experts in the field 'for checking', but

[464] Correspondence: Paul Johnstone to Patrick Moore, 22/6/1956

[465] Smith, R A (1956): 3

[466] Durant III, F C (1956): 2

[467] Moore, P (1956): 1

he had overall control over *Spaceflight*'s output, until he left the post in July 1959[468]. Moore's aims were;

> 'to do two things. First of all, to set up a basic information centre, to get all the information about space flight, and secondly, to set up satellite tracking stations around the world.'[469]

The first of these aims was met by the type of informative article mentioned above, which were an attempt to bring the public up to speed with developments in astronautics. Moore's second aim was more ambitious, and the BIS never succeeded in setting up tracking stations around the world, although this was achieved by other organisations including the BAA.

Nevertheless, satellite tracking was to become a more prominent theme in *Spaceflight* once successful launches started to take place in the closing months of 1957, and readers were introduced to the concept of tracking objects in the sky through the more conventional practise of amateur astronomy, through a series of articles in *Spaceflight*. This placement of astronomical articles in a magazine devoted to space flight reflected Moore's belief that 'rocketry and astronomy must merge into one science'[470], and Moore points out that there was a large overlap between the two fields of interest, which was reflected in terms of membership of the BIS and the BAA[471]. Whilst earlier articles in *JBIS* on astronomy were sporadic, a new *Spaceflight* serial entitled 'Sky Diary' provided readers with an up-to-date reference for what could be identified in the night sky. This was a format that could be

[468] Interview with Patrick Moore, 2/11/09

[469] *Ibid.*

[470] Moore, P (1957): 45

[471] Interview with Patrick Moore, 2/11/09

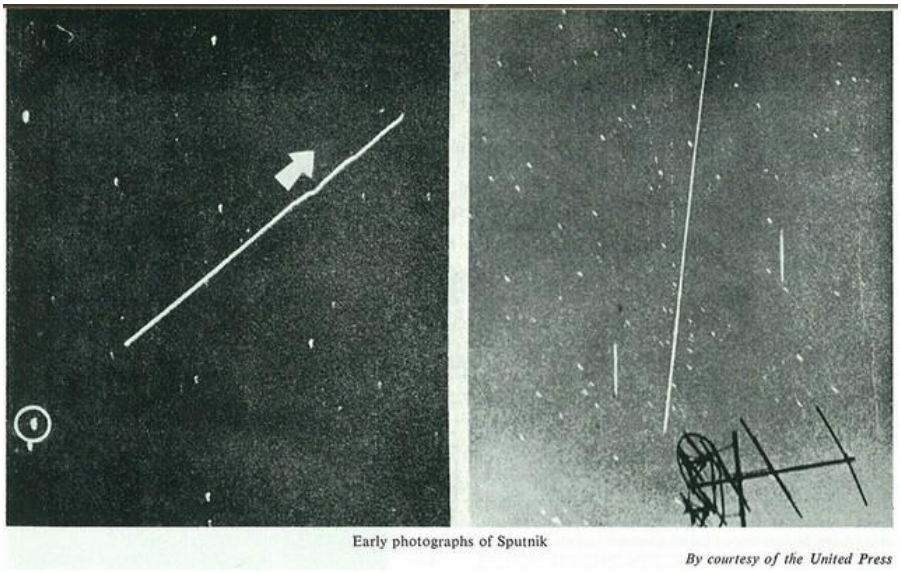
repeated regularly, since the patterns in the night sky change on a regular and predictable basis.

Once the artificial satellites did begin to appear in Earth orbit, readers were encouraged to observe the sky in order to track them, and even before the launch of *Sputnik 1* in October 1957, BIS members were organising themselves into a 'visual observing programme', in anticipation of an American satellite launch[472]. Here, the BIS adopted a scheme instigated by the American astronomer Fred Whipple in association with the Smithsonian Astrophysical Observatory and the International Geophysical Year, called 'Moonwatch'. This programme enrolled a network of voluntary amateur satellite-watchers, mostly in the United States, but also on a global scale, in countries including Australia and Japan. The intention was for amateur satellite spotters to collect information that would tell the more advanced satellite-monitoring stations in the United States where to look at in the sky. It turned out that, when *Sputnik* was launched to the surprise of the western scientific community, the advanced Baker-Nunn satellite-tracking cameras were not ready, and only the amateur 'Moonwatchers' with their simple telescopes were in a position to record the first artificial satellite, and the first such observation was made in Australia on the 8th October 1957, four days after *Sputnik's* launch[473]. To this effect, *Spaceflight* reported that the Yorkshire branch of the BIS was establishing a small observatory at Harrogate, which was intended to form a branch of the 'Moonwatch' programme, although it is unclear how successful this branch was in spotting the new satellite. However, following the successful Soviet launch, press photographs were published in *Spaceflight* showing '*Sputnik*' leaving a trail across the sky (See Figure 32). Although not taken by BIS members, these photographs would have suggested to the reader that observation of man-made satellites was possible from the

[472] Thompson, G V E (1957): 79

[473] McCray, P (2006)

ground, with equipment as simple as a camera. Indeed, the television aerial seen in one of the photographs is a recognisable element that would familiarise this perspective for the reader as a domestic gaze.


Early photographs of Sputnik

By courtesy of the United Press

Figure 32 - *Sputnik* photographs in *Spaceflight* **1**(6): 199

Alongside the photographs, instructions were set out in the accompanying *Spaceflight* article, noting that the best chance of spotting the satellite would be when the its passage over the UK came within one hour of sunrise or sunset, with the use of a pair of binoculars or a low magnification telescope[474]. Apart from visual images representing *Sputnik,* the better-known moniker of this satellite was its iconic 'beep-beep' sound that was emitted by a radio transmitter, and there were efforts to track *Sputnik* by ham radio enthusiasts, both in the United States[475] and in the Soviet Union[476]. However, these efforts are said to have been not nearly as effective as the visual observing programme[477], as the radio equipment required was more expensive and complicated to set up, in comparison to the simple visual

[474] Reddish, V C (1958): 198

[475] Ham Participation in IGY (1958): 8

[476] Bulkeley, R (1999)

[477] McCray, P (2006): 651

devices that were used as part of the 'Moonwatch' programme, in which the Yorkshire branch of the BIS participated.

In summary, what tends to mark astronomy articles out from other pieces in *Spaceflight* is the possibility of audience engagement. Here, readers were able to take information and use it in their own performance of astronomical observation, and this served as an enrolment technique for new readers. This format was developed by Patrick Moore in his capacity as editor, and this was to be used more effectively in his television programme *The Sky at Night*, which would elicit a more direct engagement between the presenter and the viewer.

Following his appearance on *Panorama* in 1956, Patrick Moore contacted Paul Johnstone, the BBC producer who had invited him on to the discussion, with a suggestion for a new programme:

> 'The other scheme I did mean to suggest was a series devoted to practical astronomy, giving people ideas as to how they themselves can take up astronomy as a hobby and do observational work ... there are many people who would rather learn what to look for on the Moon, by using a small telescope, than to hear about remote galaxies.'[478]

Johnstone replied:

> 'When we do our next big series on astronomy, you might well be the Glyn Daniel, introducing the appropriate experts, etc.'[479]

[478] Correspondence: Patrick Moore to Paul Johnstone, 17/10/1956

[479] Correspondence: Paul Johnstone to Patrick Moore, 19/10/1956

Johnstone's response to Moore makes reference to the television personality and archaeologist Glyn Daniel, who presented the BBC programme *Animal, Vegetable, Mineral?* in the mid-1950s[480], which Johnstone produced. This programme was created around the same time as ITV came into existence, and would have served the need to raise viewing figures in light of the new commercial competitor to the BBC. Daniel seems to have been of a similar mould to some of the more well-known BIS members described in this chapter, and became known as a populariser of science, in particular archaeology. He was appointed editor of the archaeology journal *Antiquity* in 1958, which was, like *Spaceflight*, a publication that sought to fill a gap in the market between the press and 'learned' publications[481].

Apart from this cross-reference, a number of interesting themes can be brought out of this short but significant exchange between Moore and Johnstone. First, that *The Sky at Night* was Moore's idea, a fact which emphasises the personal nature of his involvement with the popularisation of astronomy through innovative approaches to new media in the 1950s. This was not a pre-existing programme whose producers hired Patrick Moore, taking advantage of his ebullient personality, but a project instigated by its presenter, who had a genuine passion for the subject matter. It is also clear that the theme of audience engagement was a defining element to the programme right from the start. Rather than following in the BBC tradition of 'Talks' programmes presented by an expert in the manner of a lecture, *The Sky at Night* sought to actively engage its audience through instruction and encouragement. Moore's comparison of the ever-present Moon with 'remote galaxies' in his letter perhaps alludes to this conceptual difference between that which is accessible to an audience and something more distant that might be the subject of a lecture. It has recently been noted that the BBC Talks department from 1955 onwards took a new direction, with 'an emphasis

[480] Renfrew, C (2004) [online]

[481] Hauser, K (2007)

on scientific discovery, technical innovation and technology's practical usefulness, in a mode that prominently featured scientists and technologists as television performers'[482], and that through *The Sky at Night* the BBC combined the 'Talks' tradition of the expert speaker with the culture of amateur science. This approach would not only reach out to television viewers in new ways, but would also promote the science of astronomy, which Moore ascertains was 'widely regarded as being practised only by old men with long white beards, who spent their lives in lonely observatories "looking at the stars" and no doubt using crystal balls as well'[483].

The new series was to be broadcast live in a fifteen-minute slot once a month, usually after 10pm on a weeknight. Its launch was not heavily publicised, and a review of newspaper listings for April 1957 reveals just one significant description of the programme, which gives a good idea of its general format:

> 'The camera will be connected to a powerful telescope which will sweep the night sky. It's all part of a new monthly series called 'The Sky at Night'. Films, photographs and diagrams will be used, as well as live looks at the heavens. Patrick Moore, well-known as the author of many books on astronomy, will point out the Plough, the Lion and other not-so-well-known constellations.'[484]

One way of approaching the content of *The Sky at Night* is to look at the production notes of the first few programmes, including the scripts, which were written by Moore and dictated live on air. Once the format had been established, it hardly changed in the course of the programme's 53-year (and counting) existence. The production notes inform us of the now iconic introductory music 'At the Castle Gate' by the late-Romantic Finnish composer

[482] Boon, T (2008): 211

[483] Moore, P (2003): 22

[484] Teletime (1957): 13

Sibelius. This was followed by the title information 'The Sky at Night / A Regular Monthly Series / Introduced by Patrick Moore', before cutting to the presenter, facing the viewer:

> 'What I want to do in these talks of mine is to tell you about some of the interesting things you can see in the night sky each month. Astronomy's not just a hobby for old men with white beards, as so many people think: everyone can take an interest in it – you don't need a vast telescope – and now is a particularly good time to start because we've got several spectacular events close ahead of us.'[485]

As mentioned above, Moore wanted to modernise the view of astronomy, away from 'white beard' associations and towards a more widespread appeal that aimed 'to hit a middle course'[486] between scientific accuracy and amateur interest. Moore himself was 34 years old in April 1957, when the first broadcast went out; a tall, engaging figure, and he certainly didn't have a white beard.

Figure 33 - Patrick Moore in 1959

Source: Radio Times [online]

[485] Production notes on microfilm: The Sky at Night, 24/4/1957

[486] VHS tape: 'Ten Years of Astronomy', 28/4/1967

Once the programme had been introduced, Moore used a variety of techniques to demonstrate and explain the phenomena that could be seen in the night sky. Studio graphics, or 'Wurmsers', illustrated pictorially some of the key constellations, and from the first programme, Moore used a graphic of the Great Bear constellation to direct viewers to other objects of interest:

> 'Saturn is certainly worth looking at ... remember, take a line from the Great Bear's tail, and you'll come to it.'[487]

In this way, the Great Bear became known as 'a sort of sky signpost'[488], and the other recognisable constellation Orion was also used in this way in some of the early episodes. Whilst using a language of familiarity to direct viewers, another important aspect to *The Sky at Night* was the range of experts who were invited on to the programme to explain various phenomena. This approach was in line with the theme of scientific rationality that the programme tried to convey. Early on, Moore first suggested this idea to Johnstone:

> 'You may consider that it is worthwhile to get a biologist to show that the idea of human beings on Venus or Mars is quite untenable.'[489]

As with other elements of popularising British outer space, Moore wanted to promote a realistic view of the solar system, and man's likely role in its exploration. Having invited the American astronomer Dr. Harlow Shapley on to the programme in September 1958, the possibility of life on other planets was discussed. Amidst some modest props including a bookshelf, a curtain and some informal seats, Shapley postulated of 'a high probability that there is abundant life scattered about the universe', whilst Moore concluded the discussion

[487] Production notes on microfilm: The Sky at Night, 20/6/1957

[488] Production notes on microfilm: The Sky at Night, 14/12/1957

[489] Correspondence: Patrick Moore to Paul Johnstone, 12/11/1956

by stating that 'where life can appear, life will appear'[490]. It was generally down to Moore himself to invite guests on to the programme[491], and this was another opportunity for the presenter to exert control over the programme content. The range of guests included amateur astronomers, members of the BAA, as well as academic scientists, radio astronomers and members of the BIS. This latter group included Philip Cleator, Arthur C Clarke, Val Cleaver, A E Slater, and Kenneth Gatland[492]. Clarke appeared in 1963 to talk about space flight theory in the 1930s, communication satellites and the possibilities for manned Lunar bases[493]. Although the details of the other appearances of BIS members remain unclear, it was apparent that *The Sky at Night* made reference to all aspects of space science, including human space travel, conditions on other planets, and the tracking of artificial satellites.

Through this range of guests and subject matter, *The Sky at Night* was able to pursue an agenda of popularising space science, through interviewing academic scientists and making their research available to a popular audience, whilst also promoting the performance of astronomy by viewers themselves. That audiences responded to this format is evident through the 'vast amounts of letters'[494] that Moore received from viewers, some of which were responded to on subsequent programmes. Furthermore, in 1966, 'star maps' were printed and sent out, with the intention of having viewers record a meteor shower and then consolidating all the results. Although conditions were not suitable for viewing that particular meteor display, the response from the public was said to have been 'magnificent', with

[490] DVD recording: 'Sky at Night Excerpts', 17/9/1958

[491] Interview with Patrick Moore, 2/11/09

[492] *Ibid*. These references have not been fully correlated in the *Sky at Night* archives.

[493] Production notes on microfilm: The Sky at Night, 10/9/1963

[494] VHS tape: 'Ten Years of Astronomy', 28/4/1967

10,000 people writing in to request star maps[495]. It is also clear that what held all these elements of *The Sky at Night* together was the performance of Patrick Moore in front of the camera, and it quickly became apparent to producers of the programme that '*The Sky at Night* is really the Patrick Moore show'[496].

[495] *Ibid.*

[496] Correspondence: Julia Gaitskell to Jean Baxter, 30/4/1965

Chapter 7

Imaginative Representations of British Outer Space

Whilst earlier chapters have explored the institutional development of the BIS, its internal publications and policies, and the popularisation of British space science, this chapter will investigate the imaginative representations of British outer space created by people who were members of the BIS such as Arthur C Clarke, R A Smith and Olaf Stapledon, and those who were not members but shared aspects of its ideology, such as the artist Frank Hampson, as well as those who fought against these ideals, which included one of the movement's most fierce critics, the writer C S Lewis. I argue that it was through fictional and artistic representations that some of the key protagonists were most able to convey their thoughts on the philosophy of space exploration, whilst this approach also served to reach out to much larger audiences than the internal discussions that were taking place simultaneously in journals and at congresses. This approach also blurs the division between fictional and non-fiction representations, and also between science, fiction, art and philosophy.

Arthur C Clarke's Space Trilogy *and his influences in the BIS*

This story starts, however, with the BIS. In previous chapters I have outlined the prevailing tension in the Society between those who sought to advance the engineering aspect of space flight, and those who embraced fictional and artistic representations in their consumption and articulation of visions of outer space. Such feelings were manifested in the debate as to whether to change the name of the BIS to something that sounded more 'respectable', and more in line with the engineering approach, as discussed in Chapters 4 and 5. Whilst this debate was played out both before and after the war, the personal memoranda of Val Cleaver from the late-1930s reveal the underlying tensions between different cliques in the BIS:

> 'One [is] struck by the queer mixture of people one gets in the BIS!'
>
> 'Most of the other members are pale youths in uncongenial positions (e.g. in city offices) and with a burning interest in what they call "science fiction". [Arthur C] Clarke is rather like this, and personally, I ~~think~~ hope that as the BIS grows this element will be outnumbered.'[497]

Cleaver went on to become Chairman of the BIS from 1948 to 1950, and was highly influential in the Society's post-war activities, particularly through the formation of the IAF in 1950-1, as recounted in Chapter 5. Cleaver was an engineer by trade, and worked for various aerospace companies including de Havilland and Rolls Royce[498], a career path which in part explains his early views on the preferred direction of the BIS. It could be said that, in the pre-war London period, science fiction enthusiasts dominated membership of the Society, which is something that Cleaver had obviously picked up on. Indeed, BIS members Arthur C Clarke and William F Temple, who lived together in London in 1937, were printing copies of the *BIS Bulletin* and the science fiction fanzine *Novae Terrae* from the same duplicator in their flat[499]. However, Cleaver's aspirations for the direction of the BIS were to some extent realised in the post-war period, when the Society took on more of a professional outlook and the informal networks of science fiction fandom and publishing were disrupted by the war[500].

In some ways, however, this dichotomy of engineers and science fiction fans was a false one. Cleaver singles out Arthur C Clarke in his note as one of the latter group, and, indeed, Clarke went on to become a highly successful science fiction writer. However, Cleaver's conception

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[497] Personal memoranda: Val Cleaver, 17/7/1938

[498] Parkinson, B (2008) (ed): 49

[499] McAleer, N (1992): 35

[500] Ashley, M (2000)

of science fiction was a narrow one, somewhat understandably a time when this genre was largely characterised by American pulp imports, alongside a nascent British interest. Furthermore, a significant proportion of BIS members in the 1930s were made aware of the Society through science fiction publications, which sometimes included advertisements or readers' notices. Clarke was one who was made aware of the Society in this way, and it has been noted in Chapter 4 that there was a significant overlap between the BIS and science fiction fans in the years either side of the Second World War. As noted in the previous chapter, this element of the BIS regularly contributed articles to the new British science fiction pulps such as *Scoops* and *Tales of Wonder*. Having become more established post-war, writers such as Arthur C Clarke started to produce novel-length contributions to British science fiction, and it was through these works that some of the ideologies associated with the BIS attained their widest level of publicity. These novels were not, as Cleaver had feared, incongruous with the mindset of the engineering contingent of the BIS, as they were more often than not based on real science, or at least, extrapolated versions of 'current' scientific and technological developments related to space flight. This approach was to characterise Clarke's fiction throughout his early career, through which he became known as an exponent of 'hard' science fiction. Typical of this oeuvre were lengthy descriptions of scientific phenomena, such as the balance of gravitational forces involved in interplanetary flight, sequences which were influenced by Clarke's first-class university degree in mathematics and physics. For example:

> 'Even now there are people who don't understand this business of "weightlessness". They seem to think it's something to do with being "outside the pull of gravity". That's nonsense of course ... An orbiting space station or rocket is in

> a kind of permanent "fall" that can last for ever because it isn't towards the Earth but *around* it.'[501]

Here, Clarke takes on a succinct but lecture-like tone, and seems frustrated at those who don't understand the principle of weightlessness in space, in a similar way that Philip Cleator earlier on tried to explain how a rocket didn't need anything to 'push against' in a vacuum[502]. Clarke's obsession with scientific accuracy comes across in most of his novels, short stories and, more explicitly, in his non-fiction works[503], and here it is important to outline what he thought of as an essential distinction between science fiction and fantasy, two genres that are often associated with one another:

> 'Fantasy is something that couldn't happen in the real world ... science fiction is something that really could happen.'[504]

A key element to this approach to science fiction is the representation of the future. All of Clarke's novels on space exploration are, indeed, set at various points in the future, from the near (a few years) to the long-range (millennia), and sometimes hop between different points in time. Although science fiction has been described as non-realist fiction[505], this technique encourages the reader to believe that the reality of the present day could be the basis for the imminent fictional narrative. As such, time is an element which Clarke transcends in his writing, and he projects the development of science to accommodate and rationalise what his imagination has conceived. For the most part, Clarke looks towards the

[501] Clarke, A C (1972a[1954]): 33 [italics in original]

[502] Cleator, P E (1935b): 239

[503] Particularly his *Interplanetary Flight* (1950)

[504] McAleer, N (1992): 139

[505] Kitchin, R and Kneale, J (2002): 3

future in this way, but in the few instances where the past is invoked, this occurs as part of a natural progression that inevitably ends up in the future[506]. This way of writing can be associated with the theory of technological determinism, in which social progress is driven by technological innovation, following a predestined, linear course towards an ever-increasing level of advancement. This principle has been examined historically by Michael Smith in relation to the representation of rail travel and the American frontier, as well as post-war aspirations for nuclear technology[507], but Clarke predicted that technological advances would lead humankind to ever further reaches of outer space, from Earth orbit, to the Moon, the Solar System and beyond. I will go on to identify how Clarke associates such technological and exploratory advances with the social progress of humankind. I shall also highlight how Clarke's progressive outlook was often paired with a language of terrestrial familiarity, which included evolutionary and maritime terminology[508].

Following the Second World War, Clarke quickly became a prodigious writer of both fiction and non-fiction, and his output was almost entirely related to the exploration of outer space. His influences lay in the world of pre-war science fiction pulp magazines, as well as in his wartime activities working on radar, his post-war degree in mathematics and physics, but above all, his involvement with the BIS[509]. His first novel, *Prelude to Space*, has been examined elsewhere in this thesis for its insights into the grounded aspects of space exploration and the perceived role of Britain and the BIS; however, it is in his following narratives that Clarke became most familiar with depicting interplanetary space. A recurrent

[506] See, for example, 2001: A Space Odyssey, where Clarke jumps directly from the stone age to the space age.

[507] Smith, M (1994): 38

[508] As also identified in Cleator's (1936) *Rockets Through Space* (Cf. earlier chapter on 'Popularising the Science of British Outer Space')

[509] McAleer, N (1992)

pattern to these early novels sees a male protagonist who is initially a keen outsider, being introduced to man-made interplanetary spaces, often by a male authority figure. This is essentially a plot device that serves to introduce these spaces to the reader. Indeed, Clarke received criticism that his stories lacked believable characters, and, in response to this, he deploys greater complexity in some of his later protagonists, but they can all essentially be read as different versions of Clarke himself. Peter Nichols has highlighted this criticism, whilst suggesting that Clarke's fiction can be divided into two stages: his earlier, 'genre sf' which suffered from 'wooden prose' but found expression through the depiction of science; and the later works which introduce transcendental themes through the depiction of 'the ancient, inscrutable wisdom of alien races', and is 'the closest thing sf has produced to an analogy of religion'[510]. Here, I shall primarily examine Clarke's *Islands in the Sky* (1954), *Earthlight* (1955) and *The Sands of Mars* (1951), which all deal with humankind's anticipated progression into outer space, and are set in Earth orbit, on the Moon and on Mars, respectively. I choose to focus on these works rather than Clarke's later, more expansive narratives, because they reflect the connection between the BIS and fictional representations most clearly. They were also written at a time when Clarke was most active in the BIS – he was twice Chairman between 1945 and 1953, and lived in London from the end of the war until he emigrated to Ceylon in 1956[511]. The three titles I have mentioned were later incorporated into a single volume[512], which indicates the thematic similarities between them, although the characters and events portrayed are not explicitly connected.

It is appropriate to start with *Islands in the Sky*, as this novel depicts what was perceived as the most achievable goal of space exploration in the late-1940s and early-1950s, which was

[510] Nicholls, P (1981a): 121 - 122 ('sf' is a widely-used abbreviation for 'science fiction')

[511] Ceylon became known as Sri Lanka in 1972

[512] Clarke, A C (2001)

the near-earth orbital space station. Indeed, in January 1949, the *BIS Journal* published a paper by Harry Ross[513] on the subject of 'Orbital Bases'. This was one of the first serious discussions of Earth-orbital space stations to take place anywhere, and Ross envisioned a manned space station consisting of a large solar power dish, along with living quarters, laboratories and workshops for a crew of twenty-four, specifically:

> '1 Station Director, 1 Deputy Station Director, 1 Chief Mechanical Engineer, 3 Assistant Mechanical Engineers, 1 Chief Electrical Engineer, 3 Assistant Electrical Engineers, 2 Astronomers, 2 Meteorologists, 2 Physicists, 2 Biochemists, 2 Cooks, 4 Orderlies'[514]

Such ideas concerning the form and function of the anticipated space stations also find expression in Clarke's *Islands in the* Sky. This short novel comprises a loosely assembled montage of the experiences of a sixteen year-old 'space mad' boy named Roy Malcolm, who wins a competition to be sent into outer space. Here, a series of space stations are explored, including the Inner Station (500 miles from Earth), Meteorological Stations (6,000 miles), Biology Labs and Space Hospital (15,000 miles), and finally the Relay Stations (in a 'fixed' orbit of 22,000 miles). Paralleling Ross' projected list in the *BIS Journal,* the personnel encountered on Clarke's fictional space stations form a community of scientists and engineers, with a 'Commander' in charge of operations. Parallels with the BIS, and Ross's article in particular, are maintained through the pictorial representations of BIS member R A Smith. The front cover of the first edition of *Islands in the Sky* pictures an interplanetary scene not unlike a drawing which accompanied the *JBIS* article, and a comparison between the two images can be made easily:

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[513] Originally delivered orally to the BIS in London on November 13th 1948

[514] Ross, H E (1949): 11

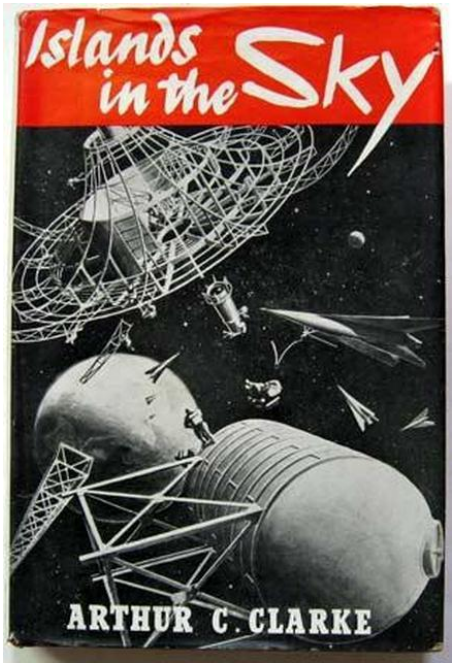


Figure 34 - Front cover of Clarke's first edition of *Islands in the Sky* (1954) with R A Smith drawing

Figure 35 – 'Spacestation in Space': Illustration in H E Ross's 'Orbital Bases' article, by R A Smith [*JBIS* **8**(1):9]

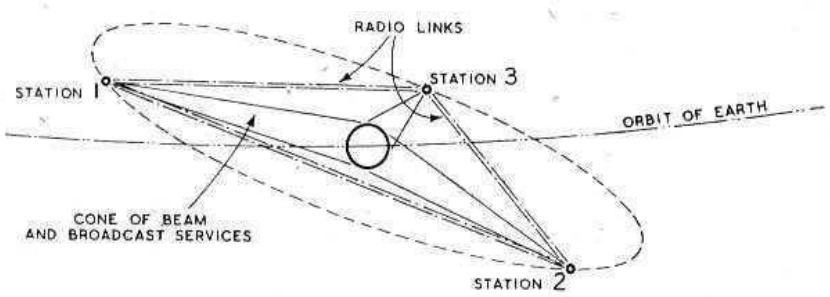
The main feature of these illustrations is a solar power dish, which was intended to 'tap the flood of energy pouring from the Sun, and to convert it into useful electric power'[515], and this can be seen in construction in Figure 34 surrounded by other space flight ephemera, and in its completed form in Figure 35. The intertextual connections continue as Ross's paper

[515] Clarke, A C (1972a [1954]) [This novel was first published by Sidgwick and Jackson, before being re-printed by the children's publisher Puffin. This reflects the youthful nature of the book, with its teenage protagonist, and is unusual among Clarke's novels]

makes reference to a 1945 article by Clarke in the amateur radio and electronics journal *Wireless World*, which introduces the concept of geostationary satellites[516]. These are satellites whose orbital period is such that they remain fixed over a specific spot on Earth, as opposed to lower-level satellites which sweep across the Earth's surface rapidly. In *Islands in the Sky*, Clarke recalls this technical vision:

> 'Three great relay stations ... Linked to each other by tight radio beams, they provided TV coverage over the whole planet. ... The Sun, Moon and planets might rise and set – but the three Relay Stations never moved from their fixed positions in the sky.'[517]

This description is more or less copied from a section of Clarke's *Wireless World* article, and both accounts describe three satellite relay stations, one above Latitude 90° West serving the Americas, one at 30° East covering Europe and Africa, and one at 150° East, serving the Pacific area. In his 1945 paper, Clarke included a diagram of this model, which has been reproduced in Figure 36[518]. Here, we can see how the three stations would communicate with each other and Earth via 'radio links'.



Three satellite stations would ensure complete coverage of the globe.

Figure 36 - Clarke's diagram of geostationary satellites

Source: *Wireless World* (October 1945): 306

[516] Clarke, A C (1945)

[517] Clarke, A C (1972a [1954]): 109 - 110

[518] Clarke, A C (1945): 306

Clarke's iconic article is often cited as the very first published conception of geostationary satellites, which are used extensively today to provide communications services across the world. This orbital position has even been dubbed 'the Clarke orbit', and is the subject of speculation about the geopolitical implications of satellite technology, given its status as 'space's most valuable real estate'[519].

The literary connections between Clarke and the BIS are extended further into interplanetary space in the novels *Earthlight* and *The Sands of Mars*. The latter sees a science fiction writer by the name of Martin Gibson transported to the planet Mars as a guest on the space ship 'Ares'. His itinerary includes a transit period at the Earth-orbiting 'Space Station One', in which scenes similar to those in Clarke's aforementioned satellite adventure are played out. Once Gibson arrives on Mars, he takes the time to explore a frontier colony, which is made up of a series of interconnected inflated domes. Following a better-defined narrative arc than *Islands in the Sky*, the adventures on Mars relate to the ongoing colonisation of the planet, including the discovery of life forms that would help generate conditions suitable for widespread human inhabitation. These discoveries lead Gibson to decide to remain living on Mars indefinitely, and the end of the novel hints at the perceived breakaway of the Martian colony from Earth administration. Clarke's representation of Mars, not unlike his description of space stations, appears to be influenced by discourses within the BIS. As early as January 1948, Mars was the subject of speculation as a credible destination for human space flight:

> 'When the ice of interplanetary travel has been broken, and the majority of people have recovered from their surprise at the successful return of a Lunar Expedition,

[519] Collis, C (2009)

> then will man's questing spirit turn to the first of the planetary targets. Of the two nearest – Venus and Mars – it is probable that Mars ... will be chosen'[520]

There is little doubt that Clarke would have been aware of the article from which this passage is quoted, as he was a member of the BIS Council at this time, and it is reasonable to suggest that aspects of *The Sands of Mars* were extrapolated from descriptions in this *JBIS* paper. Based on observations conducted by the British Astronomical Association, M W Wholey goes on to speculate about the surface conditions of Mars, including the conviction that a 'green belt' existed, which would likely be inhabited by 'some types of vegetation, most probably of a degenerate character'[521]. Sure enough, Clarke's fictitious exploration of the Martian surface incorporates a description of such plant life:

> 'They were not really very exciting ... none were higher than his waist, and those around him now seemed to be made of sheets of brilliant green parchment, very thin but very tough ... those ragged sheets were spread like little sails in the sun ... Quite a triumph of evolution'[522]

In this way, Clarke described a 'thoroughly realistic colonised Mars'[523], based on the optimal scientific information available to him at the time, mediated through the BIS. He further extrapolates this 'knowledge' in the narrative by suggesting that cultivation of the plants in greater quantities would enable the generation of a breathable atmosphere for Mars.

Earthlight is an espionage thriller set two hundred years in the future, in which people have started to colonise the planets of the Solar System. The narrative takes place in various

[520] Wholey, M W (1948): 2

[521] *Ibid.:* 8

[522] Clarke, A C (1976 [1951]): 94 - 95

[523] Roberts, A (2005): 212

colonies on the Moon, and centres around a civil servant called Bertram Sadler who is sent on a mission from Earth to uncover a spy who is working for a breakaway Federation of planetary colonies. The novel starts out in a predictable fashion, with the protagonist moving through the different Lunar colonies as he attempts to identify the interplanetary spy. However, the narrative climax witnesses a battle between a domed fortress on the Moon and a Federation space cruiser. This is described at length by Clarke from the perspective of a distant observer, focusing on scientific details such as the nature of the weaponry and its effects upon the surface of the Moon. This encounter is said to have 'ended the domination of Earth and marked the coming of age of the planets', in a development which Clarke compares to the way in which 'the American colonies turned against their motherland'[524].

With this broader scope, *Earthlight* is perhaps the most ambitious of Clarke's early works, and, alongside the overriding theme of interplanetary colonies developing independently from the Earth, one notable aspect of this novel is the representation of astronomy as an integral component of interplanetary science. This is highlighted in the placement of a Lunar observatory at the centre of the narrative in *Earthlight*, where 'the largest telescope ever built by man'[525] is operated by a team of professional astronomers. The significance of this telescope is not fully revealed until the epilogue, where it transpires that the spy had used the device to send messages across space in Morse code. Moreover, Clarke assigns great importance to the development of astronomy in interplanetary space more generally:

> '[The Moon] had also proved, as the astronomers and physicists had predicted, of immense scientific value. Freed at last from the imprisoning atmosphere of Earth,

[524] Clarke, A C (1963 [1955]): 146

[525] *Ibid.*: 19

> astronomy had made giant strides; and indeed there was barely a branch of science that had not benefited from the lunar observatories.'[526]

The importance of clear skies in the practise of astronomy has been mentioned elsewhere in this thesis, including the movement of astronomers to certain favourable locations. The projection of astronomy into outer space, in a way, brings this search for optimal conditions to its zenith through the complete removal of atmospheric interference. Indeed, Clarke refers to 'predictions' that the science of astronomy would leap forward once taken into outer space[527]. Whereas in other novels Clarke extrapolates from the speculative contributions of other BIS members, here Clarke is referring to a paper which he himself delivered to the BIS in December 1946, in which he states that;

> 'The most obvious and direct result of the crossing of space will be a revolution in almost all branches of science ... Astronomy and physics will, of course, be the fields of knowledge most immediately affected ... An observatory on the Moon ... would be many times as effective as one on Earth'[528]

This idea of astronomy in outer space was expanded upon three years later by RAS and BIS member Michael Ovenden, in a lecture delivered to the BIS. Here, Ovenden illustrates the possibility of setting up a lunar observatory, before describing in detail its anticipated benefits, which would include advancing the science of astronomy 'from observation to experiment'[529]. This detailed description indicates that this topic was an enduring one in BIS circles at the time when Clarke was writing his space novels, and his science fiction narratives

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[526] *Ibid.*: 32

[527] This prediction proved somewhat accurate, as the space telescope *Hubble* went on to provide detailed images of the universe during the 1990s.

[528] Clarke, A C (1946): 71

[529] Ovenden, M W (1949): 191

would certainly have been influenced by such discussions. In these examples from three novels, we can see how Clarke's wider conception of 'hard' science fiction drew on ideas that were engendered in the forums of the BIS in the late-1940s and early-1950s. The ways in which three key ideas - the Earth satellite, the Martian colony and the Lunar observatory - are inserted into Clarke's fiction illustrate the close relationship between the imaginative and technological geographies of British outer space at this time. Far from being incompatible, as Val Cleaver feared in 1938, these discourses were complimentary, and created new intellectual spaces in which BIS members explored the interplanetary idea.

The language of Clarke's science fiction is an important aspect to consider in terms of how he attempted to procure familiarity and instil a sense of natural progression in the concepts he was describing. Ideas connected to space flight would have seemed unusual to a mainstream fiction audience in the 1950s, and Clarke needed to bridge the divide between cultural awareness and the technological progress that he envisioned. One of the ways in which he attempted to achieve this was through the adoption of maritime terminology in his descriptions of outer space and space exploration. This tendency can be traced back to the word 'astronautics', which was coined by the French science fiction writer J-H Rosny *aîné* in 1927 as *astronautique*[530]. This was then adopted in the *Journal of the BAA* in 1929, by Philip Cleator in 1936[531], and by Clarke at least as early as 1945[532]. Here, the nautical analogy recalls an earlier age of exploration, when European explorers took to the seas to discover new spaces. That this kind of invocation infiltrated the language of British, and indeed, European cultures of outer space enforces Ryan and Naylor's recent contention that there

[530] Astronautics (1989): 734

[531] Cleator, P E (1936)

[532] Clarke, A C (1945): 305

were 'strong continuities between practices and ideologies'[533] operating across the arbitrarily-imposed boundary between the twentieth century and an earlier, commonly imagined 'age of exploration'. Not only was the practice of exploration pushing new boundaries in the twentieth century, from the depths of the oceans to the polar extremities, it was also, in the case of astronautics, drawing on earlier conventions of exploration in order to publicise and familiarise its endeavours, even before the technological capacity had caught up with the ideology of space exploration.

Clarke expanded on this nautical theme to employ all manner of maritime terminology and analogy in both his fictional and non-fiction writing. This would start with the most basic of terms, the 'space ship'[534], which would 'dock' with other ships by 'hauling [them] in like an angler landing a fish'[535]. Furthermore, the title of his *Islands in the Sky* implicitly compares man-made space stations to 'islands', the space in between them analogous to the sea; whilst the 'crew' on board one of Clarke's space ships were expected to conform to maritime ways:

> 'The traditions of space were as strict as those of the sea. Five men could leave the *Acheron* alive – but her captain would not be among them.'[536]

Here, Clarke portrays an old-fashioned rescue mission from one ship to another, the main difference from its naval precedent being that the vacuum of space was the dangerous, unbreathable medium to be crossed by the crew members, as opposed to the sea itself.

[533] Naylor, S and Ryan, J (2010): 13

[534] Clarke, A C (1946)

[535] Clarke, A C (1972a [1954]): 37

[536] Clarke, A C (1963 [1955]): 140

Whereas maritime language is used by Clarke to evoke familiarity in his descriptions of space exploration, a deeper analogy can be read into this association with the sea; namely, the condition of weightlessness that comes both from being submerged in water and from being in outer space. In a chapter of *Islands in the Sky* triumphantly entitled 'Goodbye to Gravity', Clarke describes moving in zero gravity conditions as 'rather like learning to swim underwater'[537], whilst portrayals of individual space suits clearly draw from the perception of airtight underwater diving suits. Indeed, from a basic perspective, being underwater represented for Clarke:

> 'a cheap and simple way of imitating one of the most magical aspects of spaceflight – weightlessness'[538],

and one of the main reasons that Clarke started living in Ceylon in 1956 was so that he could spend more time under the sea cultivating his new hobby, scuba-diving. A tall and ungainly figure, Clarke felt encumbered by what he thought of as the scourge of gravity. This feeling took on a heightened significance after 1962, when he suffered a severe attack of polio-induced paralysis, which went on to afflict him later in life through post-polio syndrome. Writing after this episode, his descriptions of weightlessness - or, lack of it - took on a more despondent tone:

> 'All our lives, we creatures of the land must drag the weight of our bodies around with us, envying the freedom of the birds and clouds'[539]

However, even before his illness, Clarke considered being underwater and, ultimately, being in outer space, as a kind of salvation from the constant oppression by gravity on Earth. He

[537] Clarke, A C (1972a [1954]): 38

[538] McAleer, N (1992): 105

[539] Clarke, A C (1984 [1972]): 226

also framed this relationship between humans and gravity in an evolutionary context, noting how the human race had developed from creatures that once crawled out of the sea, and would eventually migrate to outer space in a return to a weightless environment[540]. This concept brings us back to the idea of technological determinism, and the conviction that, by constantly improving technologically, humankind would be able to evolve into a different kind of creature, one that would make outer space its natural habitat. Clarke hints at this kind of future in some of his early novels, introducing characters with physical ailments who would struggle to maintain a daily existence on the gravity-bound Earth, such as Commander Doyle in *Islands in the Sky*:

> 'He'd been quite an athlete, it seemed, so the loss of his legs must have been an even bigger blow to him than to most men. It was obvious why he had come to the Station – it was the only place where he wouldn't be a cripple ... He had lived here for the last ten years and would never return to Earth, where he would be helpless again.'[541]

In contrast to traditional adventure narratives, the leading characters of Clarke's novels rarely excel through heroic physical actions; rather through some conceptual breakthrough or scientific revelation, and the conditions of outer space enabled Clarke to promote this type of heroic identity. This approach to heroism was borne out of Clarke's own personal identity as a scientific thinker, and his experience of the Second World War. Indeed, whilst working for the RAF in 1943, Clarke was stationed 'on an airfield in Cornwall with a bunch of wild young scientists and engineers from MIT'[542], where he helped develop the strategically significant science of radar. Projecting this type of identity to outer space in *The Sands of*

[540] These ideas have also been explored by Bjørnvig, T (2008)

[541] Clarke, A C (1972a [1954]): 43

[542] McAleer, N (1992): 50

Mars, Clarke envisions a Martian colony that attracts only 'the really first-rate minds [who] could appreciate the challenge [of science] and respond to it'. These 'minds' throughout Clarke's fiction would almost always be either men, or young male enthusiasts, with women typically reduced to the role of the wife at home, or the obedient daughter of a male authority figure.

The narrative to *The Sands of Mars* witnesses the development of nuclear fusion as a revolutionary technology on Mars, which is 'ahead of Earth in nuclear physics'[543]. Here, Clarke alludes to his conviction that the conquest of space represents a new Renaissance[544], which would lead humankind in new directions. This concept is expanded upon more explicitly in *Earthlight*, which, towards the end, describes a separation of humankind into those who remain 'loyal' to the Earth and those who form a more progressive interplanetary alliance made up of colonies throughout the Solar System, based on advanced scientific development. Clarke uses biological terminology here, talking of 'an interplanetary brotherhood', and declaring that 'scientific research was the life-blood of civilisation'[545]. Whilst transcendental and quasi-religious themes were further explored in some of Clarke's later works[546], they were connected to this belief that the destiny of humankind, one way or another, was to be found in outer space.

Olaf Stapledon's **Interplanetary Man**

This evolutionary outlook on space exploration was also developed by the British writer and BIS member Olaf Stapledon, who is cited as being a major influence on Clarke's work[547].

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[543] Clarke, A C (1976 [1951]): 189 - 190

[544] Amis, K (1975): 80

[545] Clarke, A C (1963 [1955]): 32; 88

[546] See, for example, *Childhood's End* (1954) and *2001: A Space Odyssey* (1968)

[547] Nicholls, P (1981a)**:** 122

Stapledon was born and spent some of his formative years in and around Liverpool, and, having attended Oxford University, settled down in West Kirby on the Wirral Peninsula in 1919 and completed a doctorate in philosophy from Liverpool University in 1924. In the 1930s his life remained centred around Liverpool and the Wirral, during which time he completed his most celebrated works of science fiction[548]. Given the proximity to events relating to the formation of the BIS, it is remarkable that he appears not to have joined the Society until 1946, when he was encouraged to do so by former schoolmate and BIS Council member A E Slater[549]. By this time his writings were well known and admired by people in the BIS, particularly his *Last and First Men* (1930), which is an expansive imaginary projection of the next two billion years of human evolution across the planets of the Solar System. This narrative, which was influenced by ideas developed in Stapledon's post-doctoral book *A Modern Theory of Ethics* (1929), follows a Hegelian dialectic whereby civilisations rise, fall, and are renewed, in the evolution of new human species. Starting with the 'First Men', Stapledon narrates a superpower rivalry between the United States and China, the emergence of a World State, followed by a nuclear holocaust which leaves only thirty-five survivors stationed at the North Pole, out of which develop the 'Second Men', and so on until the 'Eighteenth Men' who inhabit the planet Neptune.

In 1948 BIS Secretary Len Carter wrote to Stapledon requesting a contribution to the Society's lecture programme on a subject 'touching on social, philosophical and other problems connected with space flight'[550]. Having accepted, Stapledon went to considerable effort drafting three versions of his lecture, which was delivered later that year and was also

[548] Crossley, R (2004) [online]

[549] Correspondence: A E Slater to Olaf Stapledon, 26/9/1946

[550] Correspondence: Len Carter to Olaf Stapledon, 25/2/1948

published in the *BIS Journal*[551]. Annotated correspondence in the run-up to this talk reveals some of Stapledon's thought processes, as he crosses out the titles 'Man and the Planets' and 'New Worlds to Conquer', before finally settling on 'Interplanetary Man'[552].

Figure 37 - Olaf Stapledon lecturing to the BIS on the 9th October 1948, standing next to Val Cleaver

Source: Parkinson, B (2008) (ed): 35

In his talk, Stapledon envisaged three possible futures for humankind:

> '1) actual and speedy annihilation; 2) the creation of a world-wide totalitarian ant-state, based on atomic power and the reduction of all human individuals to robots; 3) the founding of a new kind of human world, in which the Aladdin's lamp of science will be used wisely'[553]

The latter description comprised Stapledon's vision of utopia, in which 'the highly specialised venture of interplanetary travel' would take precedence, a vision that shares some similarities with his narrative in *Last and First Men*. His talk went on to describe what might be found on other planets in the Solar System, and how humans might 'transform conditions on some of the planets so as to make them inhabitable by man'. Conversely, Stapledon

[551] Stapledon, O (1948)

[552] Annotations by Olaf Stapledon on correspondence from Len Carter to Olaf Stapledon, 16/4/1948

[553] Stapledon, O (1948): 215

speculates that, if the planets are inadaptable in such a way, humans might be able to adapt themselves to existence on other worlds:

> 'Given sufficient biological knowledge and eugenical technique, it might be possible to breed new human types of men to people the planets'[554],

in such a way that 'specialised human Martians' would be derived from 'the Tibetans, who are used to a cold, arid environment and a rarefied atmosphere'; and, more disturbingly,

> 'By very drastic eugenical operation on the existing human form, it might be possible to enable the present human brain to be supported, in spite of excessive gravitation [on the larger planets], by throwing man into the quadruped position, greatly strengthening the four legs, and at the same time pushing the head far backwards so as to distribute its weight evenly'[555]

In this way, Stapledon envisioned 'a Commonwealth of Worlds [where] new levels of mental and spiritual development should become possible, levels at present quite inconceivable to man'. Although not directly active in the early-twentieth century British eugenics movement, Stapledon was clearly influenced by discourses promoted by groups such as the Eugenics Education Society, which was established in 1907 and began publishing *The Eugenics Review* in 1910. This could be described as a mainstream political movement, whose advocates included the biologist Leonard Darwin (son of Charles), the influential economist John Maynard Keynes, the geneticist and science populariser J B S Haldane and the then-future Prime Minister Neville Chamberlain[556]. Having enjoyed an upsurge in popularity in the early-1930s, the eugenics movement in Britain went into decline from the end of that decade, for

[554] *Ibid.*: 219

[555] *Ibid.:* 220

[556] Searle, G R (1976)

a variety of reasons including associations with the worst excesses of the Nazi regime, as well as moral and religious objections from the medical profession and the Church[557]. It remains to be seen as to whether Stapledon was attempting to specifically contribute towards a post-Nazi racial theory through his projected utopia of interplanetary eugenics, although implicit in his argument was the conviction that, having achieved interplanetary travel, humans would overcome societal aversions to what he called 'the Aladdin's lamp of science'. Indeed, although Stapledon acknowledges that some of the motives behind this kind of interplanetary spread of the human race include the exploitation of physical resources 'to increase the luxury of human beings on earth' and the 'increase in man's power over the environment', he emphasises that the most appealing motive would be:

> 'using the planets to make the "most" of man, or the "best" of him, in fact for the full development of the distinctive capacities of the human species'[558]

As such, it seems as though Stapledon's primary interest in this endeavour was the liberal development of science, which for him meant the physical expansion of humankind's sphere of influence, into the kinds of interplanetary spaces which would in turn facilitate the biological evolution of the human race.

Arthur C Clarke was in the audience of Stapledon's lecture to the BIS, and raised a number of, mostly technical, points in his domination of the ensuing discussion. Although Clarke rarely went this far in terms of his concept of evolutionary development in space, particularly in terms of eugenics, his writing did share some aspects of Stapledon's 'Interplanetary Man', particularly the conviction that humankind was destined to evolve towards outer space. Here we can see how discourses of British outer space developed in the post-war period, moving

[557] Searle, G R (1979): 168

[558] Stapledon, O (1948): 225

away conceptually from the rocket as the key idea of interplanetary science, towards detailed and imaginative discussions about the ways in which life could extend to interplanetary space. That this discourse took place in the overlap between the BIS and science fiction is no surprise given the similar patterns in the pre-war period, and the lead proponents of what could be termed 'interplanetary evolutionism', including specifically Clarke and Stapledon, were to come under severe criticism for these views by another popular writer of science fiction, Clive Staples Lewis.

The Clarke - Lewis encounter and Lewis' Romantic protest

Although never a member of the BIS, C S Lewis is an important figure in this story because he was one of the few people who criticised the interplanetary movement for moral and spiritual reasons, a condemnation that was handed out through direct contact with BIS members, as well as in various forms of writing. This clash of ideas culminated in 1954, when Arthur C Clarke met with Lewis at the Eastgate hotel in Oxford; the former brought with him fellow BIS member Val Cleaver, the latter was accompanied by another distinguished Oxford don and fellow writer, none other than J R R Tolkien, and there the interplanetary debate was thrashed out over several hours[559]. The precise contents of this discussion remain unknown, however, writing in 2001, Clarke recalled the meeting:

> 'Needless to say, neither side converted the other, and we refused to abandon our diabolical schemes of interplanetary conquest. But a fine time was had by all, and when, some hours later, we emerged a little unsteadily from the Eastgate, Dr Lewis'

[559] From Imagination to Reality - An Audio History of the British Interplanetary Society (2008) [multimedia CD]

parting words were: "I'm sure you're very wicked people – but how dull it would be if everyone was good"'[560]

Although it appeared to end benignly, this interplanetary summit represents a clash of ideals on the most expansive terms, encompassing moral, religious and technological discourses that characterise not just the opinions of two prominent British writers, but also the wider movements of interplanetary science and Romantic protest in mid-century Britain. There is a substantial prelude to this discursive moment in Oxford, which not only includes correspondence between Clarke and Lewis, but also comes across through Lewis' written work, including his essays and, most significantly, his fictional 'space trilogy': *Out of the Silent Planet* (1938), *Perelandra* (1943) and *That Hideous Strength* (1945)[561].

It is understood that, before the Second World War, Lewis and his friend J R R Tolkien thought that there was a lack of the kind of stories that they were interested in. To remedy this situation, they decided that each should write an 'excursionary thriller'; Lewis' being a space-story and Tolkien's a time-story[562]. The former would result in Lewis' space trilogy[563], whilst the latter would go on to become one of the most popular series of all time, *The Lord of the Rings*. These works differ in a fundamental sense from the kind of writing characterised by Arthur C Clarke and others that I have highlighted so far. Although stories set in outer space are usually identified as 'science fiction', Lewis and Tolkien became proponents of 'fantasy', and their understanding of this genre went beyond Clarke's conviction that fantasy was simply something that 'couldn't happen in the real world'. Tolkien, and by implication, Lewis, drew their conception of fantasy from the literary theory

[560] Clarke, A C (2003): 33 - 34

[561] It should be noted that C S Lewis is most widely known for his *Chronicles of Narnia* fantasy novels, which were first published between 1950 and 1956

[562] Downing, D (1992): 35

[563] This is also referred to as the 'Ransom trilogy'

of Samuel Taylor Coleridge, who saw literature as a lamp rather than a mirror. That is, literature created 'Secondary Worlds which illuminate, rather than reflect, reality'[564]. As such, fantasy is not completely separated from the real world, but draws on certain pre-existing conventions and is rational by its own standards[565]. This approach allowed Lewis in particular to promote certain ideas about Medieval cosmology and Christian apologetics in a medium which would be aimed at a popular audience and could be enjoyed at the level of the adventure story as well as through its allegorical messages. To understand these messages we must first explore the personal background of Lewis, and further contextualise his approach to writing popular literature.

Lewis, like Tolkien, was a veteran of the First World War, where he fought in the trenches, and was wounded by an exploding shell in the Battle of Arras in 1917[566]. After the war he spent most of his life in the academic surroundings of Oxford and Cambridge, where he taught Medieval and Renaissance literature. As such, his academic interests lay in the language and literature of the middle-ages, and his scholarly texts *The Allegory of Love* (1936) and *The Discarded Image* (1964) focus on these themes, considering works such as Dante's *Divine Comedy* and Milton's *Paradise Lost*, whilst elevating the significance of Medieval cosmology. Lewis' fixation with a pre-modern conception of 'the heavens' has been the subject of much popular and academic attention recently, an interest triggered by Michael Ward's audacious claim that the well-known *Chronicles of Narnia* are each symbolic interpretations of the pre-Copernican heavenly bodies – The Moon, Mercury, Venus, The Sun, Mars, Jupiter and Saturn[567]. This new interpretation raises the status of Lewis as an

[564] Veldman, M (1994): 46

[565] Cf. Balfe, M (2004)

[566] Bennett, J (2004) [online]

[567] Ward, M (2008)

author of great skill and complexity, particularly as, previously, the *Narnia* stories were generally seen as somewhat simplistic tales of children's fantasy adventure with a rather obvious religious allegorical tone. A critical engagement with Lewis' space trilogy adds to the argument that this was an author who had faith in a Medieval world-view which was compatible with Christian apologetics, and conceptually represented what could be seen as the polar opposite of the interplanetary movement that has been examined so far in this thesis. With this focus on the past, Lewis regarded himself as 'a dinosaur still surviving from the lost age when ... the material and the spiritual interacted to create a vital culture'[568].

It is with this background in mind that a full understanding of Lewis' decision to write his space trilogy can be acquired. In a letter to Lancelyn Green dated 28/12/1938, Lewis states:

> 'What immediately spurred me to write was Olaf Stapledon's *Last and First Men*, and an essay in J B S Haldane's *Possible Worlds*, both of which seemed to take the idea of [space] travel seriously and to have [a] desperately immoral outlook.'[569]

Stapledon's novel has already been mentioned in this chapter, and Haldane's article echoed some of his eugenical language. Entitled 'Man's Destiny', the offending essay 'rhapsodises about "man's taking his own evolution in hand" and of the possibilities of our species literally conquering the cosmos'[570]. Lewis' condemnation of this stance was repeated in more general terms in later correspondence with Arthur C Clarke (dated 7/12/1943), where he maintains that 'a race devoted to the increase of its own power by technology with complete indifference to ethics does seem to me a cancer in the universe'[571]. For Lewis, therefore, the

[568] Veldman, M (1994): 54

[569] Quoted in Hooper, W (2004) (ed)*:* 236

[570] Downing, D (1992): 38

[571] Quoted in Hooper, W (2004) (ed): 594

kind of optimistic, progressive scientific thought that was being adopted by the BIS and the wider world of popular science, and represented by the likes of H G Wells, Haldane and Stapledon, represented the worst aspects of the modern world, which he sought to counter by recalling an earlier time. Lewis saw interplanetary exploration in particular as a representative example of what he called 'scientification' or 'evolutionism', and he sought to replace this vision with a different view of the cosmos through his space trilogy, which is set on Mars, Venus and Earth, respectively.

Lewis' main character in the series is a man named Elwin Ransom, a philologist who we first meet rambling through the English countryside in search of a night's rest, in *Out of the Silent Planet*. He is then abducted and drugged by two characters, Weston, a 'famous physicist', and Devine, his collaborator, and it is only when Ransom has been launched into outer space against his will that he wakes up and begins to realise his fate:

> '"You mean we're – in space?" Ransom uttered the word with difficulty as a frightened child speaks of ghosts or a frightened man of cancer.'[572]

Here, Ransom views outer space with a sense of dread, which is in complete contrast to the sensations that one of Arthur C Clarke's characters displays:

> 'Gibson felt a wonderful sense of exhilaration. The moment he had waited for all his life had come. He was in space!'[573]

The expectations of these characters of outer space are entirely different; a feeling of unfamiliarity, fear and sickness on the one hand, and an expectant sense of boyish excitement on the other. This is compounded by the status of the characters themselves. Ransom is kidnapped and taken into space against his will, otherwise content in the bucolic

[572] Lewis, C S (1966 [1938]): 21

[573] Clarke, A C (1976 [1951]): 6

surroundings of the English countryside[574], whereas Clarke's Gibson gets his ticket to space by winning a competition, and is clearly excited about it. Furthermore, the prospect of seeing the Earth from space triggers contrasting emotions by these authors, who have both been said to have based their protagonists on versions of themselves[575]. For Clarke:

> 'From a thousand kilometres away, Earth was still very large – and something of a disappointment. The reason was quickly obvious. He had seen so many hundreds of rocket photographs and films that the surprise had been spoilt: he knew exactly what to expect'[576]

In contrast, Ransom initially mistakes the Earth in the window of the space ship for the Moon, the size of the alien object scares him, and when he eventually realises the planet's true identity, he derides it as a 'megalomaniac disk', and a 'monstrous orb'[577], as seen from the heightened perspective of outer space. Whilst this view reflects the extraordinary and initially unwelcome aspect of interplanetary space for Ransom, he goes on to develop a more appreciative stance as the narrative plays out during his voyage to Mars (or 'Malacandra') in Weston and Devine's space ship. Ransom's initial conception of 'space', it is explained, was based on 'a nightmare, long engendered in the modern mind by the mythology that follows in the wake of science', and, having experienced being in this medium, the nightmare was falling off, to the extent that,

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[574] This scenario brings to mind Tolkien's Bilbo Baggins, who is taken from the pastoral comfort of 'The Shire' on an unexpected adventure in *The Hobbit* (1937). Tolkien and Lewis are known to have read their draft narratives aloud to each other as part of their 'Inklings' group meetings in Oxford in the 1930s and 1940s.

[575] In relation to Lewis, see: Downing, D (1992): 102

[576] Clarke, A C (1976 [1951]): 7

[577] Lewis, C S (1966 [1938]): 20

> 'the very name "Space" seemed a blasphemous libel for this empyrean ocean of radiance in which they swam ... No: Space was the wrong name. Older thinkers had been wiser when they named it simply the heavens.'[578]

Instead of being an empty, dead 'space' between the living planets, Lewis re-configures interplanetary space as a heavenly body in itself, and the planets as spaces formed not by addition to, but subtraction from, the surrounding brightness. As this idea is developed, a disparity emerges between the nature of interplanetary space and the act of human space exploration, and it is the latter that Lewis associates with an immoral extension of modern science. Directly satirising the likes of Haldane, Stapledon and 'other proponents of Evolutionism'[579], Lewis has his antagonist Weston describe his philosophy of space exploration:

> 'We have learned how to jump off this speck of matter on which our species began; infinity, and therefore perhaps eternity, is being put into the hands of the human race.'[580]

> 'I am prepared without flinching to plant the flag of man on the soil of Malacandra: to march on, step by step, superseding, where necessary, the lower forms of life that we find, claiming planet after planet, system after system, till our posterity – whatever strange form and mentality they have assumed – dwell in the universe wherever the universe is habitable.'[581]

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[578] *Ibid.*: 29 - 30

[579] Downing, D (1992): 128

[580] Lewis, C S (1966 [1938]): 23

[581] *Ibid.*: 145-6

Here we can see a reproduction of some of the characterisations of interplanetary thought that have been highlighted earlier in this chapter by members of the BIS, particularly the implication that humankind will expand into the rest of the Solar System and beyond, evolving in different ways over time. In his narrative, Lewis counters this point of view through the voice of Ransom, who declares:

> 'I consider *your* philosophy of life raving lunacy. I suppose all that stuff about infinity and eternity means that you think you are justified in doing anything – absolutely anything – here and now, on the off-chance that some creatures or other descended from man as we know him may crawl about a few centuries longer in some part of the universe.'[582]

As such, the ferocious debate that is depicted on the surface of Malacandra reflects the real tension that Lewis had identified between the progressive view of space exploration and a more conservative stance that has been identified by Meredith Veldman as a strand of Romantic protest that was later taken up by the Campaign for Nuclear Disarmament and the Green movement in twentieth century Britain[583].

It is not until the series moves on to its second instalment, *Perelandra*, that Lewis' religious allegories are fully expanded. Here, Ransom is taken to the planet Venus (or 'Perelandra'), not by his initial abductors, but by a mystical creature known as 'Oyarsa', which can be seen as one of Lewis' arch-angels of the interplanetary cosmos. Perelandra is portrayed as a Paradise, a Garden of Eden before the Fall of Man, and its surface is covered by vast oceans on the waves of which ride large mats of exotic, fruit-bearing vegetation:

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[582] *Ibid.:* 24 [italics in original]

[583] Veldman, M (1994)

> 'For his first few days on Perelandra [Ransom] was haunted, not by a feeling of guilt, but by surprise that he had no such feeling. There was an exuberance or prodigality of sweetness about the mere act of living which our race finds it difficult not to associate with forbidden and extravagant actions.'[584]

Despite these lavish descriptions, Lewis' vision of Venus is plausible in a sense, as the planet's surface as viewed from Earth is obscured by a thick layer of cloud, which allows for a certain amount of artistic license. His representation of Mars uses similar extrapolations, with descriptions of steep valleys which are analogous to the Martian 'canals' that were thought to exist. These elements of plausibility illustrate the aforementioned connections between fantasy and reality that Lewis sought to maintain in his novels. His Edenic Perelandra, however, is threatened not by Weston as we know him from *Out of the Silent Planet*, but by nothing less than the Devil himself, who is seen to possess the body of Weston, transforming him into a demonic 'un-man'. This creature acts as the Tempter to the human-like 'Green Lady', who represents the Biblical character of Eve, and as the narrative transpires, it is up to Ransom to physically destroy the Weston-Devil and thereby preserve the sanctity of Perelandra. The implication in this narrative is that the 'fallen' society on Earth was in danger of spreading throughout the Solar System, threatening the hierarchical cosmos that Lewis has brought up to date from Medieval times.

It is in the midst of these fantastical descriptions that Lewis makes his most obvious allusions to the BIS and the wider popular science movement, and this is what connects these stories to the criticism of interplanetary ideology most explicitly. These passages are worth quoting at length:

[584] Lewis, C S (1983 [1943]): 32

> ‘Professor Weston ... was a man obsessed with the idea which is at this moment circulating all over our planet in obscure works of ‘scientification’, in little Interplanetary Societies and Rocketry Clubs, and between the covers of monstrous magazines, ignored or mocked by the intellectuals, but ready, if ever the power is put into its hands, to open a new chapter of misery for the universe. It is the idea that humanity, having now sufficiently corrupted the planet where it arose, must at all costs contrive to seed itself over a larger area: that the vast astronomical distances which are God’s quarantine regulations, must somehow be overcome.’
>
> ‘beyond this lies the sweet position of the false infinite – the wild dream that planet after planet, system after system, and in the end galaxy after galaxy, can be forced to sustain, everywhere and forever, the sort of life which is contained in the loins of our own species – a dream begotten by the hatred of death upon the fear of true immortality, fondled in secret by thousands of ignorant men and hundreds who are not ignorant. The destruction or enslavement of other species in the universe, if such there are, is to these minds a welcome corollary.’[585]

Here we have explicit references to ‘little Interplanetary Societies’ and ‘monstrous magazines’, subjects that have been examined directly in this thesis, and the dread that Lewis associates with them, along with the prospect of human space exploration. Lewis also connects the prospect of space exploration with a general view of modern science that, for him, had disturbing consequences for the future of humankind. In the third instalment of his trilogy, the character Devine re-appears with a new name, ‘Lord Feverstone’, and is a leading figure in a research establishment known as the ‘National Institute for Co-ordinated Experiments’, or N.I.C.E, which descends ominously upon the sleepy and traditional

[585] *Ibid.*: 73

university town of 'Edgestow'. Feverstone reveals some of the ambitions of this group, which include 'sterilisation of the unfit, liquidation of backward races, selective breeding [and] biochemical conditioning', before echoing the language of Olaf Stapledon in the anticipation of 'a new type of man'[586]. In these passages Lewis associates the interplanetary movement, perhaps somewhat unfairly, with the more radical theories that some BIS members were promoting, in his denigration of interplanetary eugenics.

It is the more direct references to the BIS that prompted Arthur C Clarke to first write to Lewis. As part of a lengthy letter dated December 1943, he writes:

> 'I wish to disagree, somewhat violently with you over a passage on p.92 of *Perelandra* ... The interplanetary societies must be taken more seriously ... The panic fear of technological progress is an admission of the belief that man cannot be trusted with knowledge. If indeed you believe this ... then once again you are faced with the problem of the arbitrary barrier. Where should one cry "Halt!" to the advance in man's knowledge of the universe?'[587]

In his response of 7/12/1943, Lewis, with a certain amount of nuance, confirms his fear that 'a point of view not unlike Weston's is on the way'[588]. This was the start of a correspondence of about a dozen letters between Clarke and Lewis, in which Lewis turned down invitations to speak to the BIS about his views, and to attend Clarke's 1946 lecture on *The Challenge of the Space Ship*. The letters remained cordial, and this tone is exemplified by Lewis' comment in his letter of 24/9/1946:

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[586] Lewis, C S (1983 [1945]): 42

[587] Quoted in Miller, R (2003) (ed): 36 - 38

[588] Quoted in Hooper, W (2004) (ed): 594

'I wish your lecture every success *except* a practical realisation of space travel!'[589]

Details about any possible correspondence leading up to the meeting at the Eastgate between Clarke, Lewis, Tolkien and Cleaver remain unknown. Nonetheless, the personal exchanges and literary contrasts between the two writers illustrate a key conceptual battleground in the morality of British outer space; one regarding space exploration as an essential impulse of the human race, the other believing that runaway interplanetary science would represent a moral danger. Whilst these two portrayals would at first seem to be completely incongruous, it is interesting to note that both Clarke and Lewis had a significant influence, both directly and indirectly, on one of the best-loved portrayals of British outer space, the *Dan Dare* comic strips of Frank Hampson.

***Identity, landscape and mobility in* Eagle**

Eagle was one of the most popular post-war children's papers, and at its peak in the 1950s attracted almost one million readers each week. Created by Reverend Marcus Morris, who worked closely with principal illustrator Frank Hampson, it was first published on April 14th 1950[590]. Breaking away from the more established children's papers, *Eagle* sought to ameliorate the ethical and intellectual tone of this medium by bringing in aspects of Christian morality elided with a certain technological optimism, two themes that were conveyed through the paper's most well-known feature, Frank Hampson's space adventure comics, *Dan Dare*.

Marcus Morris began his career as a Lancashire vicar in the 1940s, and his long-standing interest in parish magazines first led him into the field of publishing. Having felt that these

[589] *Ibid.*: 741 [italics in original]

[590] Morris edited *Eagle* until 1960, and in this section I focus on extracts from the paper's first few years.

publications were often 'dreary and ineffective', he set about converting a four-page parish leaflet into a magazine called *The Anvil*, as an attempt to convey 'an intelligent view of Christianity'[591]. He then became interested in developing a different kind of publication, aimed at children, and was spurred on by the desire to counteract the proliferation of low-brow comics that had started to pour into Britain from America, which had developed a reputation as 'bad mass-art geared to a very low mental age'[592]. Morris wrote an article calling for the banning of such publications due to their perceived negative effects on children[593], and as such, he contributed to the 'horror comics' backlash that eventually led to the banning of certain publications under the Children and Young Persons (Harmful Publications) Act of 1955. This campaign has been documented at length by Martin Barker, who describes the comics in question as 'badly produced, on poor paper and with cheap print'[594], which contained often violent stories about crime, horror and the supernatural. The problem, as perceived by certain sections of British society, was 'American imperialism … by which every possible bad facet of American life was being exported', whilst the solution was 'the promotion of better books and magazines … national decency and higher values'[595], which, by implication, would constitute a strong element of 'Britishness'. Morris' front-page article in the *Sunday Dispatch* was broadly reflective of this movement, claiming that:

[591] Morris, M (1977): 3

[592] Hoggart, R (1957): 153

[593] Morris, M (1949)

[594] Barker, M (1984): 9

[595] *Ibid.*: 23 - 26

> 'Morals of little girls in plaits and boys with marbles bulging in their pockets are being corrupted by a torrent of indecent coloured magazines that are flooding bookstalls and newsagents.'[596]

Despite these associations, Morris was convinced that 'the strip cartoon was capable of development in a way not yet seen in England', and 'could be used to convey to the child the right kind of standards, values and attitudes, combined with the necessary amount of excitement and adventure'[597]. It is through this moral lens that *Eagle* was envisioned, and, having met his main collaborator Frank Hampson, the drive to publish the first copy of the paper began in 1949. By approaching the relatively small publisher Hulton Press, which also produced the left-leaning photojournalistic magazine *Picture Post*, Morris and Hampson wanted *Eagle* to develop not only as a reaction to the 'horror comics', but also as a quite radical departure from the existing British tradition of comics. These were typified by titles for younger children such as *Dandy* and *Beano*, against which *Eagle* would be presented as more realistic and intellectually challenging. Indeed, it has been noted that the publishing industry in the early-1950s, faced with the closure of many nineteenth century weeklies such as *Funny Cuts* and *Illustrated Chips*, was no less than 'overhauled' by Morris and Hampson's efforts[598]. For example, whilst many girls read *Eagle*, the majority wanted their own paper[599], and Hulton began publishing sister paper *Girl* in November 1951, with tales of boarding school antics and equestrian adventure. Other papers also emerged in the wake of *Eagle*, such as *Tiger* (1954), *Valiant* (1962), and *Lion* (1952), which eventually absorbed *Eagle* in 1969.

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[596] Morris, M (1949): 4

[597] Morris, M (1977): 3

[598] Gravett, P and Stanbury, P (2006): 13

[599] Varah, C (2004) [online]

Eagle was an instant success, the first issue being a sell-out of 900,000 copies. Morris outlined the publication's manifesto in his first editorial, where he described *Eagle* as 'an entirely new kind of strip-cartoon paper'. As part of a concerted reader enrolment strategy, Morris invited readers to join the 'Eagle Club', which was to be 'one of the most important features of the paper [with] very definite aims and standards'[600]. The Eagle Club was also a success, with applications from around 60,000 readers after the first two issues, and members were encouraged to behave in certain ways, and follow a set of basic rules. This moral stance was re-enforced by the introduction of a special kind of club membership, which rewarded exemplary behaviour. As written in the opening editorial, this second step was to become a 'Mug':

> 'The Mugs are the people who are some use in the world: the people who do something worthwhile for others instead of just grabbing for themselves all the time.'[601]

Mugs are described in opposition to 'the Spivs – also called wide boys, smart guys, hooligans, louts or racketeers', who stand for individualism and self-gain. Acts which deserved Mug status were not necessarily acts of heroism, and neither did they have to be spectacular and sensational. Rather, a person who 'quietly helped someone out of difficulty at great loss to himself', became the kind of Mug the paper was looking for, whilst various 'famous Mugs of history' were profiled for inspiration, such as the telecoms pioneer Marconi[602].

Alongside the messages about society and good character promoted directly by Morris in his editorials, and which were implicit in some of the paper's other features, the second major

[600] Morris, M (1950): 1

[601] *Ibid.*: 3

[602] *Ibid.*: 3 [all quotes]

thematic element of *Eagle* was the representation of modern technology. Contributing to this theme, the 'cutaway' pictures by artist Leslie Ashwell Wood held a prominent status at the centre fold of each weekly issue. These pages presented an image, usually either an example of new civic amenities, such as the Festival of Britain's 'Dome of Discovery', or the latest modern technology, such as the satellites of the late-1950s. The images were highly accomplished and detailed, whilst embedded reference numbers were linked to captions providing technical information. Their distinguishing feature was that some of the outer casing of the object in question would be 'cut away', revealing its inner workings. This style followed in the tradition of some of the popular science and technical hobbyist magazines that I have examined in earlier chapters[603]. In this way, the reader is assigned the privileged perspective of a scientist or engineer, and is presented with pictorial as well as descriptive knowledge of quite complicated mechanics to a level of detail that would normally be unseen.

Drawing together these two principal themes of moral citizenship and modern technology, Frank Hampson's *Dan Dare* comic strip was the flagship feature of *Eagle*, occupying the first two pages of each issue. These space adventure comics, set in a future vision of the 1990s, were known for their vibrancy, use of colour and attention to detail, which was in line with Marcus Morris' desire to produce a high quality publication. This standard was achieved through the use of a studio system, whereby several artists worked on the strips simultaneously, and items such as military uniforms and space ships were often copied either from models or the real thing. A further level of scientific rigour and detail was added through the employment of Arthur C Clarke as an adviser to the some of the early editions of *Dan Dare*, which involved him contributing to the scripts as well as checking the drafts for

[603] Cf. Bowler, P (2006)

technical accuracy[604]. There are somewhat contradictory accounts of how this collaboration came about. An *Eagle* fanzine article suggests that Clarke was put in touch with Hampson via a source at the BBC, and that the two met in February 1950 to discuss the project[605]. However, a biography of Marcus Morris refers to a 'letter from the Assistant Secretary (formerly Chairman) of the BIS', which contains Clarke-like language:

> 'I think this might amuse you. Yesterday I was lecturing at the Royal Geographical Society on the problem of interplanetary navigation ... After a highly technical series of remarks, [one of the speakers] ended up by asking "*Will* Dan Dare reach Venus?"'[606]

This mention of *Dan Dare* refers to a narrative climax from one of the opening episodes, which was publicised at the time on billboard posters. A lecture by Clarke indeed took place at the RGS on the 21st April 1950[607], and Morris' biographers suggest that the resultant letter was the basis on which Clarke was commissioned to work on *Dan Dare*. This account goes on to claim that by the 27th May that year, Clarke had despatched three scripts of 1,500 words each for the price of 30 Guineas[608]. Following his close involvement with Morris and Hampson during 1950, Clarke is said to have thought that 'the standard of work and research was so high that they were wasting their money getting him to check it'[609], and this particular collaboration came to a close. Clarke's upbeat and optimistic writing style must have

[604] McAleer, N (1992): 75

[605] Perkins, A (2007)

[606] Morris, S and Hallwood, J (1998) [italics in original]

[607] Meetings: Session 1949-50 (1950)

[608] Morris, S and Hallwood, J (1998): 141 – Here, it is also stated that Clarke could not remember exactly which episodes of *Dan Dare* he wrote, although if the dates mentioned are accurate, it could not have been any of the first six episodes.

[609] Clarke, Fred (Arthur's brother), quoted in Vince, A (2007): 37

impressed Morris, as, later that year, one of his short science fiction stories, 'The Fires Within', was published in *Eagle* under the pseudonym Charles Willis. This was a re-print that originally appeared in Walter Gillings' pulp digest *Fantasy* under another pseudonym, E G O'Brian[610], and is a story of scientific adventure that involves the exploration of the inner earth using an advanced form of sonar[611]. In this respect, it is not surprising that the similarities between Clarke and Hampson's science fiction have been picked up on by commentators including James Edward, who identifies an optimism in their work that was at odds with most of the other science fiction being produced in post-war Britain[612].

In order to fully appreciate the representational strategies in *Dan Dare*, it is necessary to gain an understanding of the identity of the eponymous space pilot, which involves examining some of the contextual ideas surrounding his creation. Hampson and Morris' initial proposal for their star attraction was a character called 'Lex Christian', a 'tough, fighting parson in the slums of the East End of London'[613]. This type of moral heroic identity is closely aligned with what Morris saw as a necessary antidote to the imported 'horror comics', and also bears the reader back to the traditional adventure hero of the nineteenth century boys' adventure stories[614]. Furthermore, it appears that C S Lewis' space trilogy was a significant influence on the character of Dan Dare, as it represented the kind of popular adventure story with Christian values that was thought to be so lacking. Morris is said to have been an admirer of

[610] Stableford, B (1986a): 213

[611] Willis, C (1950)

[612] Edward, J (1987)

[613] Morris, M (1977): 4

[614] Watkins, T (2000)

Lewis' work, apparently writing a 'glowing review' of *That Hideous Strength*[615]. Indeed, he explained how:

> 'one day, after re-reading C S Lewis' novel *Perelandra*, I said to Frank [Hampson] that I thought Lex Christian should leave London and go out into space'[616]

Morris would have been struck by Lewis' conflation of the Biblical story of the Garden of Eden with the concept of interplanetary exploration in *Perelandra*, but he saw the modernity of space exploration in a positive light, as opposed to Lewis, who considered it an ominous prospect. Morris and Hampson also understood the excitement of space exploration, and foresaw the enthusiasm with which children would take up the idea. Having decided on the space-bound destiny of their new character, 'Lex Christian' soon became 'a flying padre, the Parson of the Flying Seventh'[617], before turning into an interplanetary 'Chaplain Dan Dare', complete with collar, white cloak and gloves (see Figure 38).

Figure 38 – Draft version of *Dan Dare* - Source: Morris, S and Hallwood, J (1998)

Finally, it was decided to drop any explicit references to Christianity, perhaps in light of the decision to run several Bible-related stories in other parts of *Eagle*. Also related to the wider

[615] Morris, S and Hallwood, J (1998): 90

[616] *Ibid.*: 100

[617] Morris, M (1977): 4

moral message of *Eagle* is that Dan Dare is not a type of 'superhero' character, and does not possess any special powers; he simply uses his skills as a pilot to escape danger, and often seeks non-violent solutions to problems. Indeed, having been refined through various incarnations, Dan's principal identity is that of an ace pilot, and he is usually drawn in his pilot's cap and green military uniform. Although Dan is arguably presented as more of a working-class hero, this has obvious connections in the 1950s to the idea of the popularly revered 'heroic, aristocratic pilot'[618] and the Churchillian notion of 'the few' airmen who won the Battle of Britain in 1940. This type of identity is mixed up with Hampson's personal experience of the Second World War, and, having unsuccessfully applied to be in the RAF, he is quoted as saying that Dan Dare 'was the man [he] always wanted to be'[619]. Hampson did, however, serve as an army truck driver in the war, was evacuated from Dunkirk in 1940, and later took part in the D-Day landings at Normandy. These heroics are, indeed, re-enacted in some of the early episodes of *Dan Dare.* Hampson's interest in space flight can also be traced to his wartime encounter of German rockets. Having reached Belgium in 1944, 'he saw the doodle-bugs on their way to London', and later recalled that 'on the quays of Antwerp you could watch the birth of space travel'[620].

Alongside the identity of the main protagonist, it is important to examine the type of world which Hampson chose to convey in his vision of the 1990s and the ways in which space exploration was presented as an integral part of this imagined future. In this respect, the overarching narrative of the first *Dan Dare* story is set out in the opening few pages, during which one of Dan's colleagues explains that:

[618] Edgerton, D (1991): 61

[619] Crompton, A (1985):

[620] *Ibid.*: 19

'The number of people in the world has doubled since 1950 – and food supplies are growing less'[621]

Here, two issues of the 1950s are compounded into a neo-Malthusian problem, which drives the storyline in this first *Dan Dare* adventure. Fears of over-population had been given a renewed sense of credibility in this period by scientists such as the British evolutionary biologist Julian Huxley[622], and, by 1950, food rationing had been in place in Britain for a decade, and in some instances it was even more severe than it was during the war[623]. This domestic phenomenon is reflected in Hampson's future vision of Britain, so instead of rationing books, mass-produced 'vitamin blocks'[624] induce in Dan and his friends the kind of grumbling that would have been familiar to readers at the time. Hampson frames interplanetary exploration as a solution to this conflated problem of food shortages and over-population, and Dan is sent to the planet Venus to seek out new sources of food, in a mission that 'would mean life itself to millions of people'[625].

Whilst employing space exploration as a principal narrative device in this opening adventure, Hampson's landscapes draw on some of the aesthetic and technological discourses of 1950s Britain, combining the speculative and the contemporary in interesting ways. In highlighting these themes I will focus on three scenarios from the first *Dan Dare* adventure story, published in 1950 and 1951, which depict a futuristic space port, a traditional English village, and a fly-by survey of the countryside.

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[621] Dan Dare (1950b): 2

[622] Montgomery, J (1965)

[623] Kynaston, D (2007): 107 - 109

[624] Dan Dare (1950a): 2

[625] Dan Dare (1950b): 2

Figure 39 - First frame of *Dan Dare*, in *Eagle,* 14/4/1950: 1

In the very first frame of *Dan Dare*, the reader is introduced to 'The Headquarters of the Interplanet Space Fleet' (Figure 39). Whilst the presence of rockets and flying machines form a particularly striking aspect to this frame, made all the more vivid by the aerial placement of the reader's eye, the details of the surrounding landscape are also interesting. Hampson's studio team put considerable effort into maintaining the accuracy and continuity of Dan Dare's launch pad to outer space, to the extent that a complete scale model was constructed, with photographs taken from different angles to ensure consistency in the artwork[626]. Hampson's modernist aesthetic is revealed in his choice of buildings, which are sleek, white and interspersed with greenery. These have been interpreted as 'recognisable from recent British originals like Tecton's Finsbury Health Centre'[627], which was designed in the 1930s by the group responsible for London Zoo's penguin enclosure and other well-known modernist designs. Moreover, when viewing the space port landscape as a whole, as

[626] Crompton, A (1985)

[627] Sillars, S (1995): 137

well as from different angles in other frames, the general impression is that of an idealised modern industrial landscape that bears certain similarities with the nuclear facility that had been recently constructed at Windscale in Cumbria[628], including its physical placement between the sea and a background landscape of undulating mountains, which are sometimes visible. The visual similarity between the twin towers of Hampson's 'Interplanet Space Fleet HQ' and Windscale Piles 1 and 2 (which became operational in 1950 and 1951, respectively[629]), are particularly striking. A report on Calder Hall power station at Windscale sheds light on some of the decisions about the visual style of this landscape:

> 'The architects gave much thought to the appearance and placing of the buildings. This factory was on the edge of the Lake District, one of the loveliest parts of England, and everyone concerned with it was anxious that it should disturb its surroundings as little as possible ... The factory buildings are simple steel-framed structures clad in concrete and glass. No attempt is made to conceal the purpose of the factory but colour has been used in a lively way to soften its austerities.'[630]

This could, indeed, be a description of Hampson's Interplanet Space Fleet HQ, and at the very least, it can be argued that the modernist aesthetic of the building materials, the unity of form and function, and its careful placement in the landscape are all facets shared with Hampson's detailed design of the space port. Furthermore, the conflation of ideas implicit in Hampson's imagery between the promise of atomic power and the excitement of space exploration represents an interesting perspective from which to comprehend Dan Dare's initial surroundings. Indeed, the early-1950s represented a period before the formation of

[628] This facility began construction in 1947 as a plutonium processing plant for atomic weapons, before being developed to include Calder Hall nuclear power station in 1956.

[629] Health and Safety Executive (1999)

[630] Jay, K (1956): 42

the Campaign for Nuclear Disarmament in 1958, when atomic power was presented as the solution to every kind of modern-day problem[631], and the atom was a symbol of modernity and a better world to come[632].

Traditional landscapes of English pastoralism are occasionally portrayed by Hampson alongside these idealised technological vistas. For example, one opening scene depicts a cricket match taking place on a village green, complete with Church, sunshine and thatched cottages (see Figure 40), with the visual composition of the open landscape and 'Dan Dare' lettering echoing the spaceport scene in Figure 39.

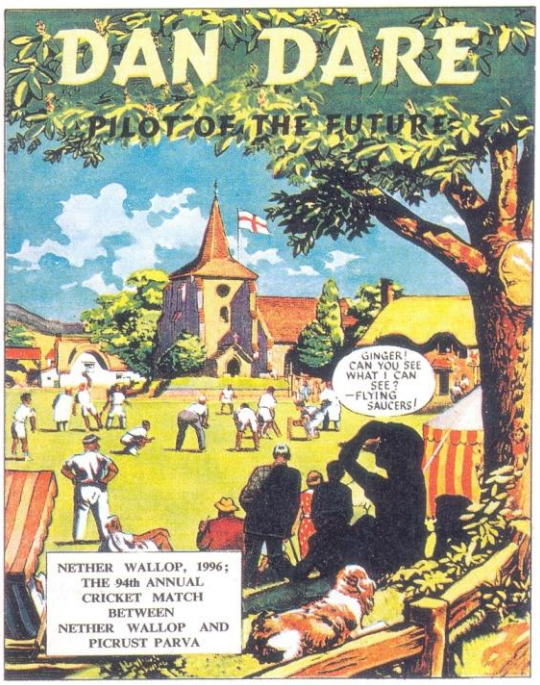

Figure 40 - *Eagle*, 10/8/51: 1

This image, when considered on a standalone basis, bears resemblance to, and, arguably, is heavily influenced by, mid-century depictions of English rural landscapes such as Frank Newbould's 1940s poster series for the War Office entitled 'Your Britain – Fight for it Now' (Figure 41) and Brian Cook's dust jackets from the Batsford guide books of the 1930s (Figure 42).

[631] Conekin, B (2003): 68

[632] Krige, J (2006)

Figure 41 - 1942 Poster by Frank Newbould

Source: Visual Arts Data Service

Figure 42 - Dust jacket design by Brian Cook for Charles Bradley Ford's *The Landscape of England* (1933)

What is interesting about the images by Newbould and Cook is that they portray traditional settings in a modern style, using sections of monochrome and a primary colour set, not dissimilar to the comic-book style of Frank Hampson and, indeed, European comics artists such as Hergé. Whereas these landscapes all represent the English village in a picturesque manner, they also share the function of publicity - advertising a book, a wartime message, and a children's paper - and use colour and delineation in a bold, eye-catching manner, whilst all contributing to forms of popular geographic knowledge[633]. By using the comics format, Hampson's image takes the modernist aspect a stage further by developing this scenario as the setting for an alien invasion in the following frames (Figure 43).

[633] Brace, C (2003)

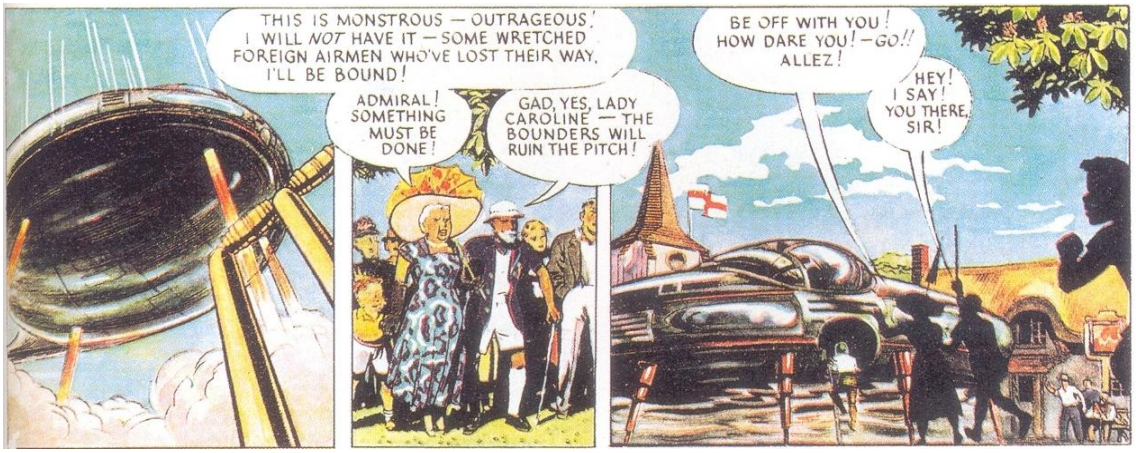

Figure 43 - *Eagle* , 10/8/51: 1

That the first contact on Earth for an attempted alien invasion occurs right in the middle of this idyllic setting perhaps demonstrates what Hampson thought might be under threat in a modernising society. At the same time, Hampson could be parodying the small-minded nature of the villagers, given that one of their main concerns is that the alien space ships might 'ruin the pitch'. The ensuing sequence could be seen as an extension of the long-standing British invasion genre, dating back to Victorian fears of incursion through an as yet unconstructed Channel tunnel[634], particularly with the appearance of an 'admiral' at the helm of the gathering angry mob, one of whom addresses the alien ship with the French command '*Allez!*'. The invasion motif in science fiction can be traced back to HG Wells' *War of the Worlds* (1898), in which Martians start their invasion of Earth on the outskirts of Woking, and this genre had been re-worked in other forms of British science fiction during the 1950s and 1960s[635]. In any case, it is important to echo Pick's assertion that 'the threat of invasion or defeat has sometimes helped to consolidate a collective sense of identity'[636], a sentiment which is displayed through the depiction of a flag of St. George at the focal point of the scene in Figure 40, as well as in the third frame in Figure 43.

[634] Pick, D (1994)

[635] Hutchings, P (1999)

[636] Pick, D (1994): 80

Hampson was one of the first comics artists to employ a cinematic approach, through the use of close-ups, mid-range and long shots, as if one were positioning a camera in a film shoot. Using this technique, Hampson drew broad landscapes from an aerial perspective, which often included depictions of civic structures such as transport infrastructure and housing developments. One of the advantages of the comics format is that movement can be portrayed conventionally through the use of motion lines[637]. They are a repeated feature of the opening page of *Dan Dare*, used to convey the motion of flying machines over the spaceport landscape, as seen in the top-right corner of Figure 39. In the following pages, Dan is transported by 'helicar', a futuristic cross between a jet plane and a helicopter, over the landscapes of Britain, to an 'emergency cabinet meeting'[638]. We follow the helicar's progress over a high-rise housing block (Figure 44) and a motorway junction (Figure 45), amongst other features, whilst details of the plot are recounted in speech bubbles.

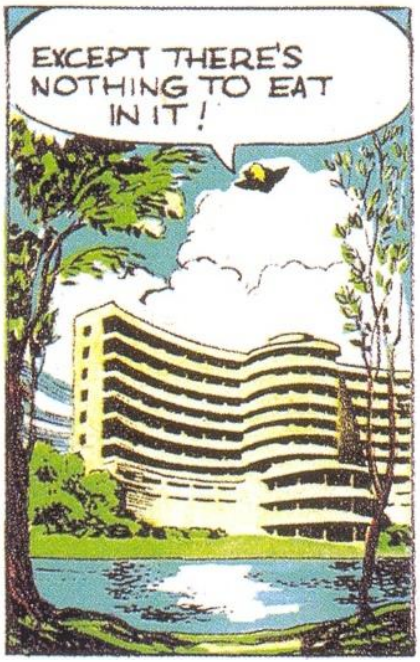

Figure 44 – *Eagle*, 28/4/50: 2

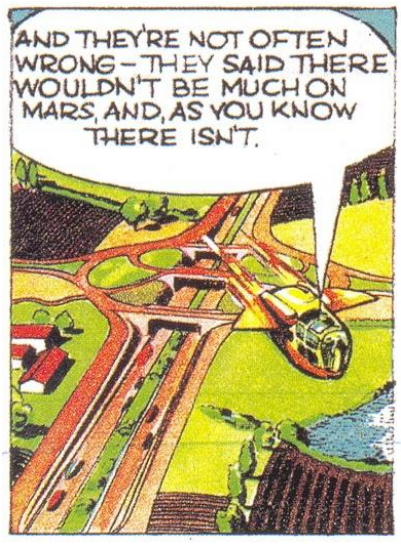

Figure 45 - *Eagle*, 28/4/50: 2

[637] McCloud, S (1993)

[638] Dan Dare (1950b): 1

Both depictions incorporate modern elements into a pastoral setting; the housing block framed in a picturesque manner by trees, and the motorway passing between ploughed fields and green spaces. Furthermore, these landscapes were created at a time when modernist principles were being utilised in the planning, design and landscaping of large-scale projects[639]. Some of these developments drew upon a growing sense of personal mobility in 1950s Britain, both in their production, through using new technology such as helicopters in the surveying of landscapes, and in their consumption, in the case of the motorway, through the growth of car ownership. The two frames above demonstrate the modernist aesthetic of housing blocks and motorway design, and also incorporate the concept of personal mobility more directly, as Dan skims across the page, from frame to frame, in his personal 'helicar'. With this in mind, Hampson's domestic landscapes promote a vision of post-war British rural modernity, which consisted of industrial, civic and dynamic spaces that were intertwined with the surrounding countryside[640].

A major part of Dan Dare's adventures involve him exploring, either through outer space, or on another planet. This could be seen as an extension of long-standing Earth-bound narratives of exploration[641], particularly in some scenes where Dan encounters alien civilisations, however, a more dominant theme connected to this practise of exploration is that of mobility. Although a multitude of different types of transport technology are portrayed in Dan's adventures, the most important in these stories is space flight itself. When Dan begins his outer space adventure, Hampson explores the use of different forms of space flight machinery. The narrative opens with news of a space craft that has already been sent to Venus, which has become the latest victim of a technical fault in the 'impulse

[639] Merriman, P (2003)**:** 116

[640] Cf. Matless, D (1998)

[641] Cf. Driver, F (2001)

cylinders', the space flight technology that has been used in Dan's world 'for the past fifteen years'[642]. It transpires that the only way to breach the atmosphere of Venus is to revert back technologically to the rocket motor, and thus a new rocket ship is constructed 'at breakneck speed' by white-coated technicians at the Interplanet Space Fleet HQ. The rocket is a form of technology that Hampson was accustomed to from the war, and the use of rocketry as a conveyor of space flight would also have been discussed with Arthur C Clarke, who was well used to this topic, and would have been recently working on his non-fiction *Interplanetary Flight* (1950). In this way Dan and his companions land on Venus, which is portrayed as a planet of lush, exotic vegetation, clearly drawing on Lewis' imaginative descriptions of the planet in *Perelandra* (1943). However, this being an adventure story, some villains are needed, and materialise in the form of the green-skinned, reptilian Venusians known as 'Treens'. Clarke is thought to have been a significant influence on the design of the Treens and their characterisation as 'scientific automatons' or 'boffins run wild'[643], whilst Hampson later revealed that they represented an embodiment of the Nazis[644], through their search for an all-powerful super-weapon and plans for the conquest of earth (see Figure 43).

Whilst mobility, and the technology of motion, is the key to Dan Dare's adventures in interplanetary space, this is occasionally counterpoised with a form of anti-mobility, particularly when Dan encounters his alien adversaries. Dan's weapon of choice is not a conventional sidearm; he uses a 'paralysing pistol'[645] to freeze his enemies in their moment of attack. This device would have served to minimise the level of violence Hampson put into his comics, mindful as he was of the editor's aim to create a clean-cut publication for

[642] Dan Dare (1950c): 2

[643] Morris, S and Hallwood, J (1998): 140

[644] Watkins, T (2000): 167

[645] Dan Dare (1950d): 2

children. However, a certain amount of menace is upheld, more through suggestion than graphic detail, in this adventure. Furthermore, when Dan is captured by the Treens at their first meeting, the antagonists use a kind of globular bubble-trap, ensnaring Dan and his companions, restricting their movement and rendering them helpless. The key point to take from Hampson's depiction of such weapons is that, whilst mobility is a crucial asset for the protagonists to control, the upper hand can also be won through rendering enemies physically immobile.

The scenarios discussed here illustrate that Hampson's comics were not just simple adventure tales illustrated in a straightforward manner, but they in fact offer reflective and sometimes quite complex readings of landscape and culture at a time when society was modernising in ways that were exciting, unpredictable and sometimes threatening. Hampson projects this anticipated sense of progress forward with his depictions of space exploration, to which he assigns centre stage in the development of humankind in the twentieth century, and it is through examining his 'national launch pad' to interplanetary space, alongside his reconstruction of the adventure hero character and its placement in moral and technological contexts, that detailed insights into the culture of British outer space can be made.

Chapter 8

Conclusions

This thesis has researched the institutional development of the BIS and the ways in which it contributed to, and interacted with, broader cultures of outer space in Britain in the mid-twentieth century. This story in itself is an important one to tell because it highlights the cultural significance of an organisation that has been largely overlooked by academics and those outside of the world of space science. In this respect, the empirical chapters of this thesis have brought us towards a number of concluding remarks, which can be grouped into three categories.

Firstly, a wide range of information about the BIS has been drawn together, forming an institutional cultural geography. The principal geographical dynamic here is the shift of the Society's centre of activity from Liverpool to London in 1936/7, a move which was largely a reflection of membership distribution. Perhaps the more interesting aspect of this geography was the fact that it was the middle-class suburbs of Liverpool where the creative spark of interplanetary science initially spread, as opposed to the traditional centres of metropolitan or academic scientific activity. Indeed, there seems to have been little discourse between the BIS and universities in general, and from the outset, we have seen how the BIS used unconventional spaces to promote and discuss their ideas as they developed from a group of individuals with a common interest into a fully functioning organisation. Far from acting as a barrier to intellectual progress, the itinerant tendencies of the Society early on enabled members to discuss and share their interplanetary ideas more widely. This was typified through meetings held at Liverpool's centrally-located Hamilton Café and a handful of pubs in London's West End. Such locations not only enabled Society business, but also generated 'tall stories' and other reminiscences which added to the general inscrutability of the BIS.

This was the prevailing tendency until a more professional mindset developed in the 1950s, which itself led to the acquisition of property in Pimlico, West London.

The BIS changed not only in terms of its geography, but also in the type of people it attracted. Pre-war characteristics of Society personnel included a strong youth contingent and a significant international membership, and although the BIS was officially open to anyone, there was only a limited place for women within the group. These early members could fairly be described as amateurs, although this type of identity often led to 'crackpot' criticism by those outside of the organisation. Despite these associations, early members of the Society managed to successfully predict some aspects of space exploration decades in advance of their realisation. Following the war, the BIS was increasingly directed towards professionals from the expanding aeronautical industry, represented by members such as the Rolls Royce rocket engineer Val Cleaver. This emergence of expertise led to a more sustained lobbying of government by the Society during the 1960s, at a time when science was becoming a highly politicised project in Britain.

Integral to the establishment of a discourse of British outer space was the publication strategy of the Society. Here, the process of knowledge demarcation was dependent on publishing books and journals, including the *BIS Journal* and *Spaceflight*. Within such outlets, we have seen how self-historicisation was an essential means by which the BIS claimed an intellectual high ground, whilst at the same time correcting and denigrating badly-wrought or incorrect assumptions about the science of interplanetary exploration. As well as producing its own publications, the Society inserted material into a vibrant pre-war popular science movement for expression and publicity, whilst interplanetary science was popularised after the war through television, magazines and works of fiction. In these acts of mediation, the personalities of certain members of the BIS were capitalised upon, particularly A M Low and Patrick Moore. We have also seen how, in the post-war period, this

multi-faceted and increasingly diverse discourse of British outer space was consolidated as the BIS professionalised by adopting the habits of account keeping, book lending and the employment of secretarial staff.

A second group of empirical conclusions can be made about the global or international outlooks of the BIS and wider cultures of British outer space. Contrary to initial assumptions that cultures of outer space may have converged around a unified idea of space exploration as a particularly British venture in opposition to other national space programmes, it has been established that an enduring internationalist outlook is what characterised the notion of British outer space in the period of interest. This trend has been identified not just in the writings of the founder members of the BIS, but also in post-war discourses, including representations both within and outside of the Society. Part of this pattern was a shift from an idealistic, utopian notion of international collaboration for space exploration towards a more pragmatic geopolitics of international ventures, primarily through the promotion of Commonwealth and European partnerships.

As these ideas of international space exploration evolved, the Second World War played an important and unexpected role in the promotion of cultures of interplanetary science. Populations in London and the south of England found themselves on the receiving end of German artillery rockets during intense periods of bombardment during the war, and this seems to have had a positive effect on attitudes towards the efficacy of rocketry both within and outside of the BIS once the war was over, despite the destruction that these weapons caused. Furthermore, the practice of popular astronomical observation experienced a resurgence during the war, as international events impacted on the living conditions and everyday habits of Britons at home.

A third area in which empirical conclusions can be drawn concern the nature of imaginative representations of British outer space. There are a number of reasons why those interested in British outer space in the mid-twentieth century turned to fiction in order to express their ideas. The most likely cause was that space exploration, at least before the war, was seen as something extraordinary, or at least something that could not easily be achieved by practical means. Moreover, ideas of interplanetary flight needed to be expressed by their owners, and fictional writing was a practicable means by which this could happen. All that was needed was a pen and paper, or a typewriter, and access to publication. Fanzines and pulp magazines therefore become significant, as it was through these forms of publication that writers such as Arthur C Clarke learned their trade and were able to gain the attention of book publishers after the war, although other routes to mass publication were also available.

Another important reason why fictional material has been important to consider is that these works have reached out to many more people than the formal activities of the BIS could ever have hoped. In this way readers could enjoy the stories for their narrative content, but also be introduced to ideas generated by discourses of the BIS. We have seen how Clarke employed a number of techniques to convey his thoughts on interplanetary exploration through science fiction. These included the adoption of maritime and evolutionary terminology, as well as representing ideas generated within the forums of the BIS, such as the possibility of a Martian colony or an orbital space station. Olaf Stapledon also contributed to discussions within the BIS, but was more influenced in his fictional writing by the theories of evolution and eugenics that were circulating at the time.

Different sets of ideas were enrolled by Marcus Morris and Frank Hampson in the *Dan Dare* comics of the 1950s, including the themes of moral citizenship, mobility and other forms of modernism, in order to frame their version of British outer space, partly in response to a perceived cultural threat from across the Atlantic. Their literary influences came partly from

the writings of C S Lewis, who drew upon medieval cosmology and a Romantic tradition of protest in his fictional critique of the interplanetary movement. This diversity of influence is emblematic of the different areas in which cultures of British outer space penetrated in this period, and highlights the previously unexplored cultural impact of the BIS.

This thesis opened with a discussion of what it means for geographers to study outer space. Two writers were identified as having produced a rationale for why outer space could be considered a productive realm of enquiry for geographers. This included Denis Cosgrove's 'new cosmographic' approach, applying the expertise of cultural geography to a broader, three-dimensional notion of space, and Fraser MacDonald's assertions that critical geopolitics should be considered the natural academic home for studies of outer space. The latter approach has itself drawn from discourses surrounding geography's 'cultural turn', and it is a contention of this thesis that a cultural landscape approach can be enrolled alongside a critical geopolitics approach to studying outer space. Thus, whilst critical geopolitics can not only teach us about overarching, supranational discourses, but also the vernacular practices and representations of global politics, we can also adopt a cultural landscape approach to examine expansive, three-dimensional environments like outer space, not just the 'grounded' landscapes of space exploration's surface imprint. Although a similar study to this one could have been written by an historian of science, it has been the intention of this thesis to take a deliberately geographical outlook in order to fully explore these patterns, drawing on geography's long association with understanding spatial concepts.

It has also been argued that human or artificial presence in space is not a pre-requisite for a cultural geography of outer space. Peoples' aspirations, fears and future projections have drawn inspiration from outer space for hundreds of years, whether it is presented as a heavenly cosmos or a blank void, and will continue to do so irrespective of human or artificial presence in outer space. However, whilst space exploration continues to shape peoples'

lives, and is expected to evolve as developing countries and private enterprises continue to push forward their own space programmes on an increasing scale, it is even more important for cultures of outer space to be understood alongside the scientific and technical aspects to space exploration that continue to offer new and exciting areas of research.

Alongside this emerging geography of outer space, other existing areas in the discipline have been opened up for further inspection. This has included the under-studied geographies of science fiction, which have only identified limited areas of interest so far, namely the post-modernist science fiction texts of the late-twentieth century. Whilst critical studies of science fiction have developed in other disciplines, this genre's predilection for describing different worlds and imagined societies surely warrant further analysis from the cultural landscape perspective, just as cultural geographers have adopted analytical techniques from the field of art history in recent decades. Possibilities for further engagement with other areas of science fiction have been identified, including the 'modernist' science fiction of the mid-twentieth century, as well as the potential for studying science fiction audiences, who are integral contributors to the discourses of this diverse and expansive genre.

A further area in which certain theoretical threads can be drawn together can be found with cultures of scientific knowledge. In the twentieth century, science took on a different kind of significance, represented by grand scale, international projects. Science also came to characterise a form of practice that has been examined extensively by geographers over recent years, that of exploration. Here we can see how scientific practice moved away from traditional locations such as laboratories and observatories into wider realms, including spaces such as mountain-tops, the polar regions and, ultimately, outer space. At the same time, we have seen how scientific practice can be considered in less dramatic environments such as the public house and the private home. In a similar vein, unconventional spaces of publishing have also been identified through a popular science movement which started in

the inter-war period with a strange array of magazines, and developed in the post-war era to incorporate new forms of mediation such as television. These intellectual spaces are significant because they encourage participation in scientific practice by audiences who would otherwise be considered passive or lay recipients of science.

With this search for popular engagements with science and technology, this thesis has examined institutional and cultural discourses outside of the traditional arenas of scientific discussion and practice. It is a contention of this thesis that these discourses can be examined in tandem to reveal more detailed accounts of scientific knowledge, identifying cultures of British outer space as more than just purely scientific, but constitutive of a discourse that has wide-reaching influences on broader popular and institutional cultures. Examining the social and cultural aspects of interplanetary science, through identifying the significance of popular culture, personalities and life-paths, have also underlined the importance of the human in human geographies of science, which have, through adopting Latourian approaches, been in danger of de-humanising studies of scientific practice, in favour of advancing our understanding of non-human agency.

The thesis has also considered how to define an archive when researching a discourse that bridges between institutional and popular culture. Instead of considering an archive as a static repository of information in one particular location, this thesis has conceived of an archive as a more expansive set of historical source materials, which in this case are all connected through the British Interplanetary Society. This has included not only the physical archive of the BIS, which itself can arguably be better described as a stock room, but also other collectives of information, such as the BIS library, the bound volumes of institutional journals and the connected publications and experiences of the wider popular cultures of British outer space. Such accounts have proved to be introspective as well as outward-looking, as some sources have looked to consolidate a genealogy of interplanetary scientific

knowledge by enrolling internal historical stories, whereas others have looked out to different cultural areas such as representations of British landscapes or popular interpretations of modern science. In any case, researching a cultural movement is a process that has been found to draw upon an extremely varied set of resources, and it is hoped that this approach has resulted in a rich and surprising account of British mid-century culture.

Chapter 9

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